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PATIENT WORKLOAD PROFILE: NATIONAL NAVAL MEDICAL CENTER (NNMC),--ETC(U)
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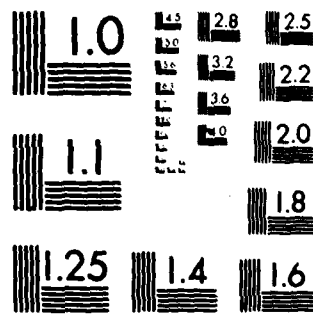
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Technical Document 377

PATIENT WORKLOAD PROFILE: NATIONAL NAVAL MEDICAL CENTER (NNMC), BETHESDA, MD

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and HW Holmerud, NOSC
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Westec Services, Inc.

June 1980

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Naval Medical Data
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This Technical Document reports on work performed under NOSC Work Unit TA37 between 1 Oct 1979 and 1 May 1980 for the Naval Medical Data Services Center, National Naval Medical Center, Code 04, Bethesda, MD 20014. This Technical Document provides site workload data for the National Naval Medical Center (NNMC) within the following functional support areas: Patient Appointment Scheduling (PAS), Laboratory, Radiology, Pharmacy, Inpatient Affairs, and Food Service. The data reported in this document covers a two-year period from September 1977 through August 1979. An accompanying document (NOSC TD 378) provides site facility profile data for the functional areas mentioned above.

The work presented in this report was prepared by WESTEC Services, Inc., San Diego, under contract N66001-80-M-1628, and the Terminals and Control Systems Branch (NOSC, Code 8153). Principal investigators were J.A. Kuhlman (WESTEC Services, Inc.) and H.W. Holmerud (NOSC, Code 8153), under the direction of W.T. Rasmussen, Head, Bioengineering Branch (NOSC, Code 5133).

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Tri-service Medical Information System (TRIMIS) Patient Workload Health care delivery and support Hospital data communications system		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This Technical Document presents patient workload data collected at the National Naval Medical Center, Bethesda, MD (plus other medical treatment facilities within the NNMC region) to provide a statistical basis for an analysis of the impact of automated data communication systems on information management to be published. This workload data covers a 2-year period for the functional support areas of patient appointment scheduling (PAS), laboratory, radiology, pharmacy, inpatient affairs, and food service. NOSC TD 378 provides a site facility profile.		

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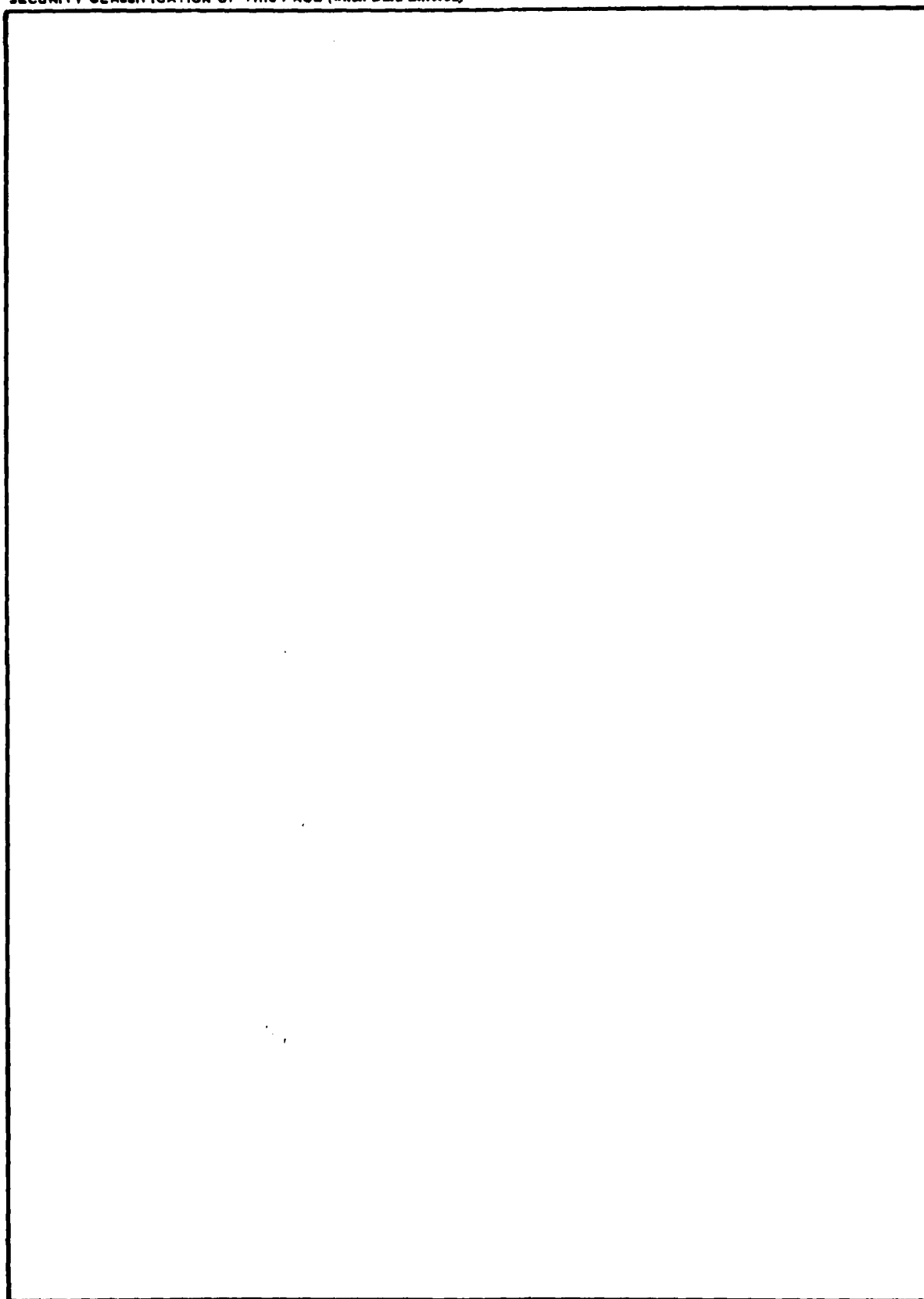
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SECTION 1

INTRODUCTION

1.1 BACKGROUND

The information explosion which has occurred in the health care industry has focused a greater need on managing medical and patient data, thereby offering the health care provider and administrator more powerful capabilities in dealing with and making decisions from that information. This can be accomplished through the orderly acquisition, organization, and communication of information in a logical, intelligible, and timely manner. The introduction of automated data communications systems has revolutionized health care delivery and support, providing a basic tool to improve clinical and administrative data management.

Automated data communications systems have a profound impact on the manner in which information is managed. They reduce, by a significant amount, the number of phone calls required for information retrieval; they minimize the manual effort expended in keeping logs; and they generate reports which represent up-to-the-minute information. In essence, these systems alter the traditional lines of communication, taking over where people now rely on paper records or voice communications.

This project has been established by the Navy Tri-Service Medical Information System (TRIMIS) Office to support the collection, summarization, and reporting of workload communications data at medical treatment facilities programmed to receive automated health care information systems.

1.2 SCOPE

The major focus of this effort centers on the National Naval Medical Center (NNMC), Bethesda and patient workload data relative to the following functional support areas:

- Patient Appointment Scheduling (PAS)
- Laboratory
- Radiology
- Pharmacy
- Inpatient Affairs
- Food Service

Information is also provided relating to PAS, Laboratory, Radiology, and Pharmacy data communications at the following medical treatment facilities within the NNMC region:

- Naval Regional Medical Clinic (NRMC), Annapolis
- Naval Regional Medical Clinic (NRMC), Quantico
- Naval Hospital, Patuxent River
- Branch Clinic, Arlington Annex
- Branch Clinic, Washington Navy Yard

Data for each are provided on a monthly basis (except as noted), covering a two-year period from September 1977 through August 1979. Both inpatient (IP) and outpatient (OP) workloads are recorded, as appropriate. Statistical parameters include mean, maximum, minimum, and standard deviation values.

This document serves as an accompaniment to Naval Ocean Systems Center (NOSC) Technical Document 378, which provides the following information concerning the aforementioned medical treatment facilities:

- Existing equipment lists
- Physical profile sketches
- Data element definition

1.3 LIMITATIONS OF SCOPE

This report presents information which reflects data and material transactions pertaining to NNMC Bethesda and the regional medical facilities listed above. As such, its concern lies with the data communications workload rather than the functional or clinical workload for each area.

This document is limited in its treatment of telecommunications parameters, and provides a data communications workload profile only, not an analysis of the communications network requirements. Network configurations, hardware, and software will be analyzed at a later date, using as a baseline the data identified in this report.

SECTION 2

PATIENT APPOINTMENT SCHEDULING (PAS)

2.1 NNMC, BETHESDA

Patient visits to National Naval Medical Center (NNMC), Bethesda are recorded in Table 2-1 and plotted in Figure 2-1. Outpatient statistics reflect outpatient visits to all NNMC, Bethesda clinics; inpatient visits to outpatient clinics and hospital bedside calls by physicians from the outpatient areas are recorded as inpatient visits. The inpatient workload figures may not accurately reflect the actual number of inpatient transactions because current practices call for manual recording of these visits, a duty sometimes overlooked on a busy physician's schedule.

A large percentage of all patient visits occur on an appointed (rather than walk-in) basis. Appointments may be generated within the individual clinic, as well as through the NNMC Central Appointment Scheduling (CAS) area. Following is a list of services which employ the CAS area for appointment scheduling:

- Allergy (active duty only)
- Cardiology
- Cardio-Thoracic
- Chest
- Dermatology
- Diabetic
- Ear, Nose, and Throat (ENT)
- Endocrinology
- Gastroenterology
- General Surgery
- Gynecology
- Infectious Disease
- Internal Medicine
- Meningomyelocele
- Neurology

Table 2-1
PATIENT VISITS - NNMCM, BETHESDA

<u>Month</u>	<u>IP Visits</u>	<u>OP Visits</u>	<u>Total</u>
09/77	10,742	33,698	44,440
10/77	6,381	31,699	38,080
11/77	8,120	33,538	41,658
12/77	10,556	31,414	41,970
01/78	10,423	33,458	43,881
02/78	8,680	29,650	38,330
03/78	11,960	35,497	47,457
04/78	8,857	31,354	40,211
05/78	7,764	34,086	41,850
06/78	7,090	33,868	40,958
07/78	4,805	30,973	35,778
08/78	10,745	33,854	44,599
09/78	9,528	30,992	40,520
10/78	7,286	32,701	39,987
11/78	4,376	31,239	35,615
12/78	4,262	27,190	31,452
01/79	5,162	32,304	37,466
02/79	4,838	26,506	31,344
03/79	5,482	32,979	38,461
04/79	5,419	32,180	37,599
05/79	4,990	33,160	38,150
06/79	4,197	32,386	36,583
07/79	4,383	30,566	34,949
08/79	7,784	33,374	41,158
MEAN	7,243	32,028	39,271
MAX	11,960	35,497	47,457
MIN	4,197	26,506	31,344
S. D.	2,484	2,087	3,946

Source: Medical Services and Outpatient Morbidity Reports.

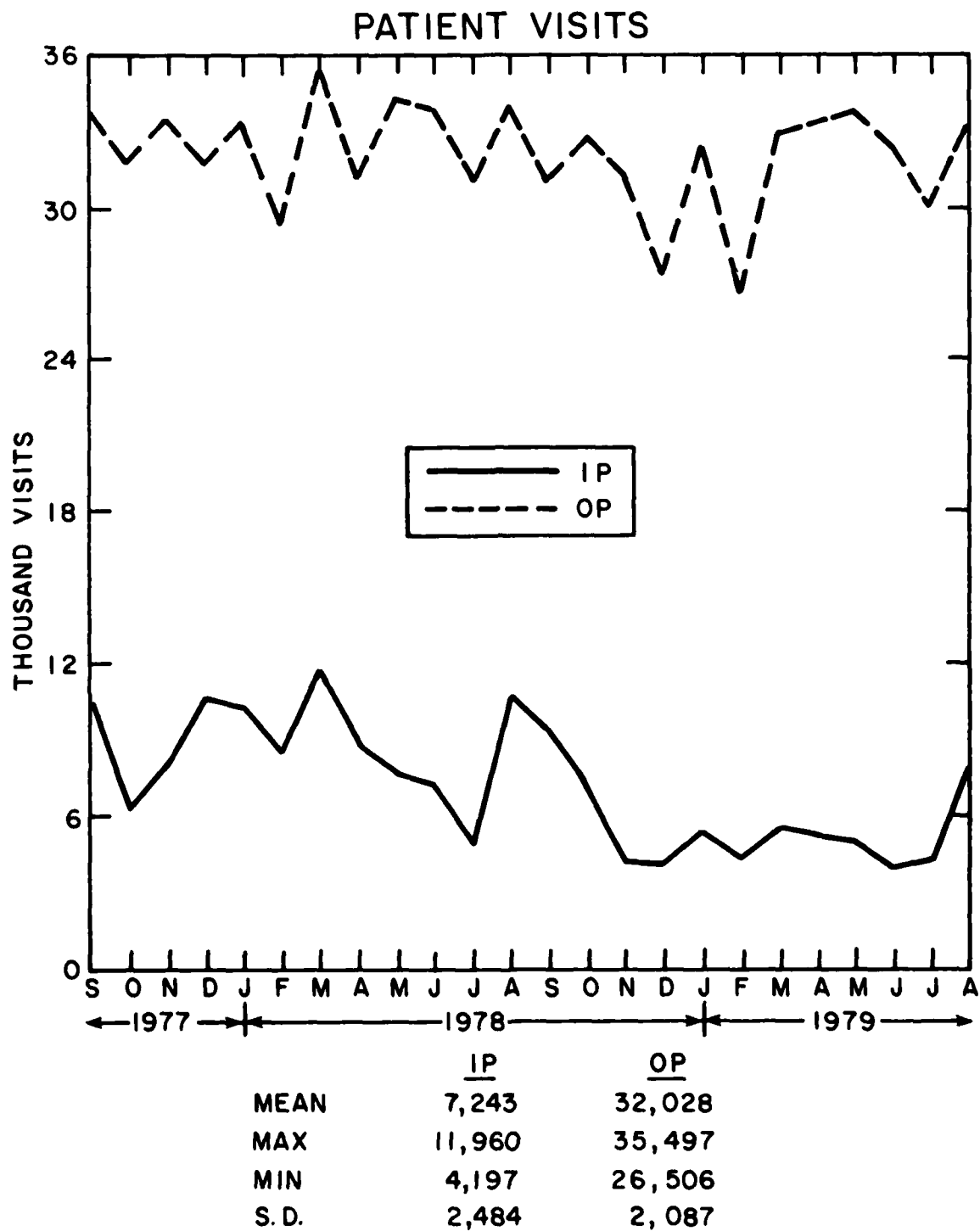


Figure 2-1. Patient Visits - NNMCC, Bethesda

- Neurosurgery
- Nutrition
- Obstetrics (new and post-partum)
- Ophthalmology
- Optometry
- Pediatric (includes Well Baby, Adolescent, and Problem Pediatrics)
- Pediatric Cardiology
- Pediatric Surgery
- Podiatry
- Proctology
- Renal
- Rheumatology
- Urology (includes Oncology and Vasectomy consultations)
- Vascular (Peripheral)

Almost every clinic which makes use of CAS services generates appointments internally as well. Table 2-2 presents additional PAS data, including appointments, walk-ins, cancellations, no-shows, and percentages of appointments scheduled within the clinic and/or by CAS.

Requests for these appointments may come from anywhere within the NNMC region, as well as from beneficiaries around the world who elect to receive treatment at NNMC. A list of the potential catchment population within the NNMC area, as provided by BUMED memo 0211, 2 March 1979, appears as Table 2-3. This catchment population may approach the CAS area by several means, the most popular of which is the telephone. Table 2-4 presents hourly incoming appointment calls for a one week period in November 1979; these figures are illustrated in Figure 2-2. Please note that these calls were recorded during a period with traditionally reduced workloads. Averaged over a typical year, approximately 800 calls are recorded each day. Telephone peaks generally occur during the late winter-early spring flu season and prior to the beginning of the school year. Daily peaks are also experienced because some clinic appointments are available only on the following days:

- Monday - Internal Medicine (booking 8 weeks in advance)
- Tuesday - Gynecology (booking 6 weeks in advance)
- Thursday - Eye Clinics (booking 6 weeks in advance)

Table 2-2
PATIENT APPOINTMENT SCHEDULING BY CLINIC - NNMC, BETHESDA

<u>Clinic</u>	<u>Appts. per Month</u>	<u>Walk-Ins per Month</u>	<u>Cancel- lations per Month</u>	<u>No- Shows per Month</u>	<u>% Clinic Appts.</u>	<u>% CAS Appts.</u>
Allergy	155	0	22	22	5	95
AMHT	1,067	20	10	40	100	0
Cardiology	625	44	44	44	20	80
Cardio-Thoracic	63	4	NA	4	90	10
Chest	275	75	12	33	50	50
Dermatology	1,667	132	110	176	5	95
Diabetic	67	26	7	7	30	70
Dialysis	87	66	0	0	100	0
EEG	152	22	44	44	100	0
Emergency Room	0	2,480	0	0	0	0
Endocrinology	520	264	27	53	30	70
ENT	1,083	334	1	9	5	95
Gastroen- terology	498	220	24	88	40	60
General Surgery	650	194	10	35	33	67
Gynecology	2,917	352	67	220	75	25
Hematology & Oncology	650	66	11	6	100	0
Internal Medicine	983	176	53	79	10	90
Medical Acute *	NA	220	45	44	100	0
Military Health	0	418	0	0	0	0

Table 2-2 (Continued)
PATIENT APPOINTMENT SCHEDULING BY CLINIC - NNMC, BETHESDA

<u>Clinic</u>	<u>Appts. per Month</u>	<u>Walk-Ins per Month</u>	<u>Cancel- lations per Month</u>	<u>No- Shows per Month</u>	<u>% Clinic Appts.</u>	<u>% CAS Appts.</u>
Neurology	666	88	45	44	10	90
Neurosurgery	173	2	NA	9	2	98
Nuclear Medicine	217	88	11	11	100	0
Obstetrics	840	44	45	88	95	5
Occupational Medicine	0	440	0	0	0	0
Occupational Therapy **	313	0	11	88	100	0
Ophthalmology & Optometry	1,907	275	56	220	10	90
Orthopedic	975	880	54	88	100	0
Pediatric	1,213	22	46	66	35	65
Pediatric Acute *	1,347	66	44	22	100	0
Physical Disability	417	88	NA	66	100	0
Physical Therapy	1,532	220	132	88	100	0
Plastic Surgery	396	9	9	13	100	0
Podiatry	302	211	18	18	50	50
Proctology	208	53	14	10	25	75
Psychiatry	477	0	22	44	100	0
Radiation Therapy	583	0	0	0	100	0

Table 2-2 (Continued)

PATIENT APPOINTMENT SCHEDULING BY CLINIC - NNMC, BETHESDA

<u>Clinic</u>	<u>Appts. per Month</u>	<u>Walk-Ins per Month</u>	<u>Cancel- lations per Month</u>	<u>No- Shows per Month</u>	<u>% Clinic Appts.</u>	<u>% CAS Appts.</u>
Renal	26	7	3	7	0	100
Rheumatology	354	110	11	11	25	75
Speech Pathology	208	0	11	11	100	0
Urology	1,208	154	23	22	50	50
Vascular Surgery	87	22	5	4	10	90

NA = Not available.

*Same day appointments only.

**Psychiatric only.

Source: Department Workload Counts.

Table 2-3
CATCHMENT POPULATION - NNMCM, BETHESDA

<u>Source</u>	<u>FY-79</u>	<u>FY-80</u>	<u>FY-81</u>	<u>FY-82</u>	<u>FY-83</u>	<u>FY-84</u>
Master Loading Plan NNMC Regional Area	187,442	187,151	186,987	187,469	187,596	187,631
Primary Loading Plan Washington D.C. Area	30,440	30,245	30,791	30,959	31,164	34,193
Primary Loading Plan Virginia Area	81,449	81,527	81,512	81,470	81,451	81,458
Primary Loading Plan Maryland Area	79,410	79,071	79,224	79,632	79,626	79,644

Source: BUMED Memo 0211, 2 March 1979.

Table 2-4
INCOMING APPOINTMENT CALLS PER HOUR - NNMCM, BETHESDA

<u>Hour</u>	<u>MON</u>	<u>TUES</u>	<u>WED</u>	<u>THUR</u>	<u>FRI</u>	<u>MEAN</u>
0700-0800	122	100	53	75	46	79
0800-0900	122	136	103	84	82	105
0900-1000	137	107	84	101	72	100
1000-1100	103	110	78	72	50	83
1100-1200	95	89	53	62	47	69
1200-1300	87	44	53	35	53	54
1300-1400	85	67	55	59	42	62
1400-1500	67	86	48	69	37	62
1500-1600	98	66	61	48	42	63
TOTAL	916	805	588	605	471	677

NOTE: The counts provided above include both received and lost calls. Of the 3,385 total incoming calls recorded, almost 20% (661) were lost to the system. Please note that these counts were recorded in November 1979, a period with historically low workload.

Source: Department Workload Counts.

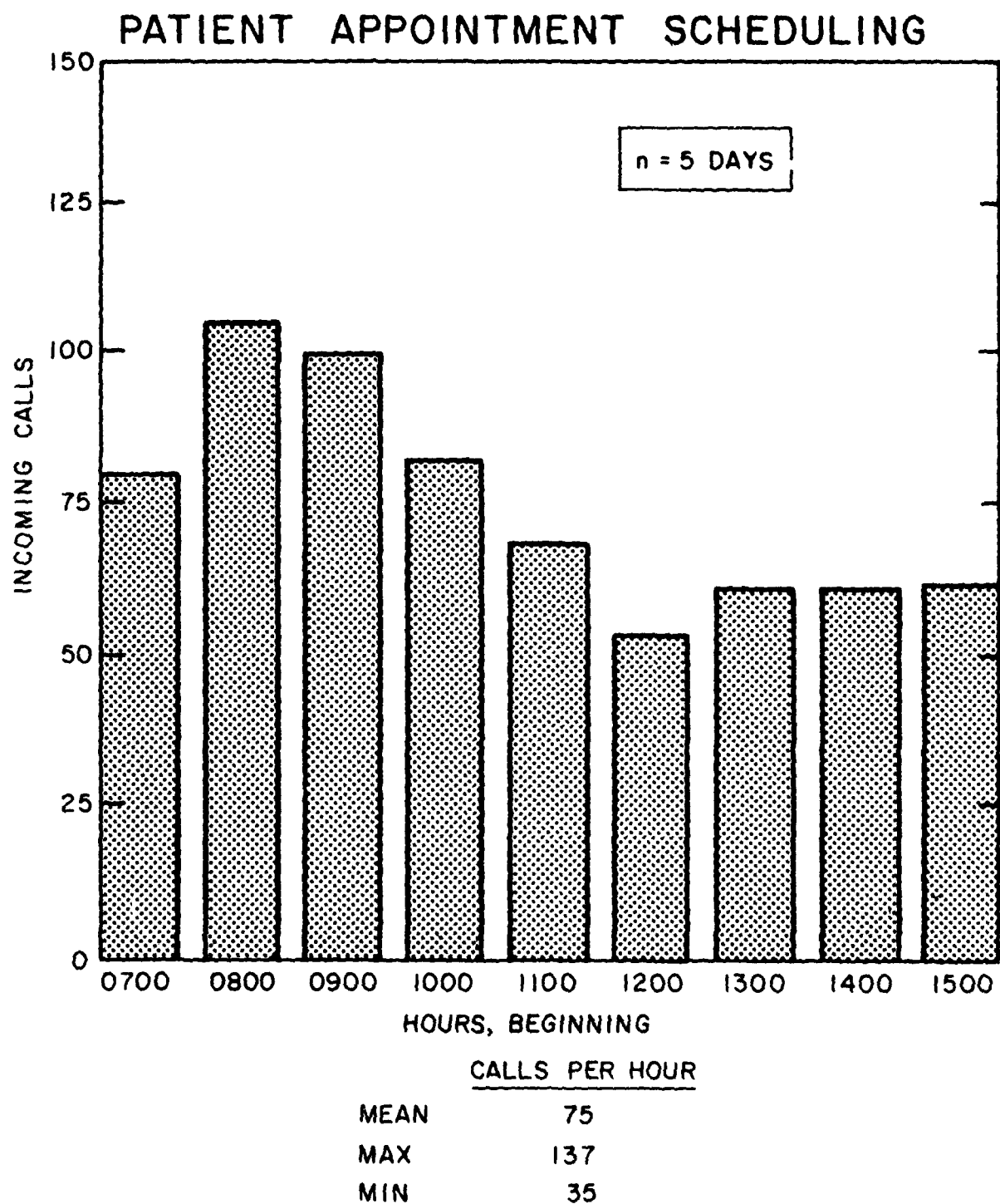


Figure 2-2. Incoming Appointment Calls Per Hour -
NNMC, Bethesda

Another input to CAS comes from written appointment requests from throughout the nation, averaging 40 per week (55-60 per week during peak periods before Christmas and college breaks). Another 150 appointments per week are generated by postcard from within the CAS area, scheduling post-partum appointments and follow-ups for Gynecology and Eye Surgery. Approximately 250 cancellations per week are received on the special CAS cancellation phone (in addition to the incoming call counts of Table 2-4). Personnel in the CAS area also refer patients to other areas within NNMC (e.g., Medical Acute Care, Patient Information), offer prep instructions (e.g., urine specimen delivery), and provide CHAMPUS benefits information (e.g., all dependent and retired allergy appointments).

Outpatient records at NNMC number from 100,000 to 105,000 before the yearly archival process, with an average of 95,000 records on hand. From 12,000 to 15,000 records are retired each year, following a 36-month period of inactivity. Difficulties arise when the records of some family members are archived and others are not, especially when record transfers are required. Two main file areas are maintained: one for all active duty personnel (except NOAA, PHS, and USCG), and one for dependent, retired, and other beneficiaries.

The NNMC, Bethesda CAS operations employ six telephone stations, with a potential for one more position. Incoming lines total 26, with 20 of these holding calls until an operator is available. All calls are answered in sequence. Four separate rotary boards contain available appointment data for all NNMC clinics and physicians. Department operating hours are 0700-1600, Monday through Friday. CAS staffing is as follows:

- Appointment Supervisor (Civilian) = 1
- Appointment Clerks (Civilian) = 6

2.2 OUTLYING CLINICS

Patient visits for the three major outlying clinics are recorded in the following tables: Table 2-5, Naval Regional Medical Clinic (NRMC), Annapolis and the United States Naval Academy (USNA) Clinic at Bancroft Hall; Table 2-6, Naval Regional Medical Clinic (NRMC), Quantico and Marine Corps Development and Education Command (MCDEC) Clinic at Mann Hall; and Table 2-7, Naval Hospital, Patuxent River. These totals are charted in Figure 2-3. Additional information is presented in Table 2-8, showing the results of the PAS Data Automation Site Survey of January 1980. A copy of the site survey data collection sheets appears as Appendix A to this report.

NRMC, Annapolis services a population consisting largely of dependent and retired beneficiaries, while the USNA Bancroft Hall facility serves only midshipmen. NRMC, Annapolis functioned as a Naval Hospital until June 1979, at which time its limited inpatient services were disestablished. NRMC workload has not changed appreciably since that time. Almost all visits to NRMC, Annapolis occur on an appointment basis, with the exception of some minor walk-in emergency cases; no Emergency Room facilities exist. The USNA Bancroft Hall Clinic offers no appointments, except for Orthopedics. Most NRMC appointments impact the Primary Care Clinic (averaging

Table 2-5
PATIENT VISITS - ANNAPOLIS CLINICS

<u>Month</u>	<u>NRMC</u>	<u>USNA</u>	<u>Total</u>
09/77	6,901	3,227	10,128
10/77	6,915	2,358	9,273
11/77	7,550	2,702	10,252
12/77	5,895	3,053	8,948
01/78	7,905	3,843	11,748
02/78	6,722	5,270	11,992
03/78	7,559	5,474	13,033
04/78	6,655	5,265	11,920
05/78	8,445	4,171	12,616
06/78	5,544	2,032	7,576
07/78	4,983	3,209	8,192
08/78	5,717	5,551	11,268
09/78	5,635	7,150	12,785
10/78	5,830	8,862	14,692
11/78	5,901	7,722	13,623
12/78	5,000	4,727	9,727
01/79	5,865	3,700	9,565
02/79	4,466	6,063	10,529
03/79	5,659	5,617	11,276
04/79	7,112	3,285	10,397
05/79	5,287	3,812	9,099
06/79	3,664	538	4,202
07/79	4,049	3,209*	7,258*
08/79	4,479	7,495	11,974
MEAN	5,989	4,514	10,503
MAX	8,445	8,862	14,692
MIN	3,664	538	4,202
S. D.	1,240	2,002	2,324

*Estimated.

Source: Medical Services and Outpatient Morbidity Reports.

Table 2-6
PATIENT VISITS - QUANTICO CLINICS

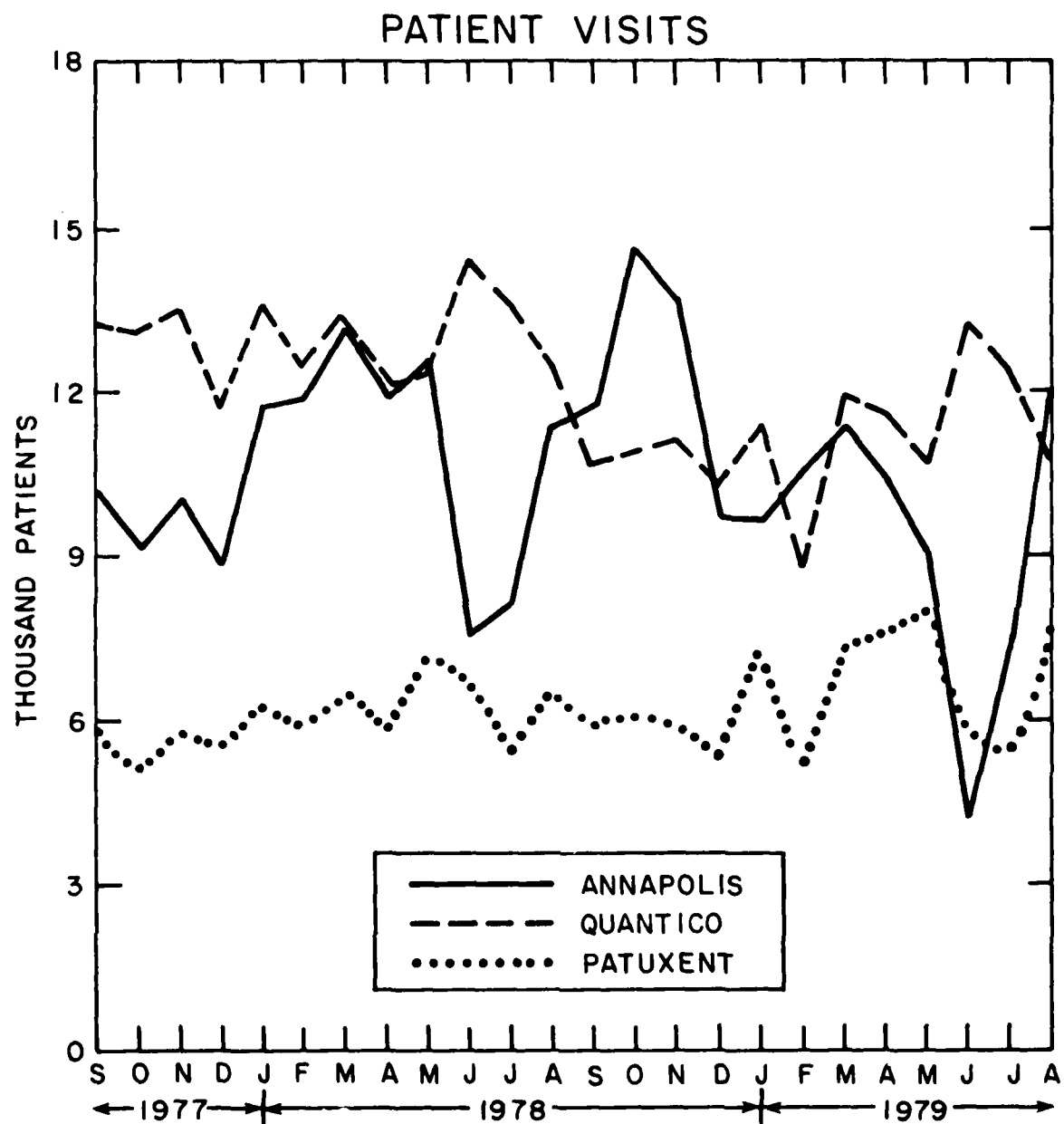
<u>Month</u>	<u>NRMC</u>	<u>MCDEC</u>	<u>Total</u>
09/77	7,778	5,365	13,143
10/77	8,093	4,982	13,075
11/77	8,841	4,708	13,549
12/77	8,174	3,548	11,722
01/78	9,373	4,160	13,533
02/78	8,133	4,424	12,557
03/78	9,009	4,377	13,386
04/78	8,462	3,605	12,067
05/78	8,570	3,984	12,554
06/78	7,418	6,856	14,274
07/78	5,900	7,686	13,586
08/78	7,068	5,331	12,399
09/78	6,419	4,358	10,777
10/78	6,716	4,354	11,070
11/78	7,314	3,915	11,229
12/78	7,366	2,942	10,308
01/79	7,443	3,852	11,295
02/79	5,788	3,096	8,884
03/79	8,130	3,731	11,861
04/79	7,844	3,519	11,363
05/79	7,114	3,566	10,680
06/79	6,943	6,953	13,896
07/79	6,250	6,797	13,047
08/79	5,870	4,823	10,693
MEAN	7,501	4,622	12,123
MAX	9,373	7,686	14,274
MIN	5,788	2,942	8,884
S. D.	1,014	1,289	1,350

Source: Medical Services and Outpatient Morbidity Reports.

Table 2-7
PATIENT VISITS - NAVAL HOSPITAL, PATUXENT RIVER

<u>Month</u>	<u>IP Visits</u>	<u>OP Visits</u>	<u>Total</u>
09/77	31	5,660	5,691
10/77	44	5,132	5,176
11/77	60	5,615	5,675
12/77	29	5,434	5,463
01/78	59	6,158	6,217
02/78	50	5,880	5,930
03/78	69	6,370	6,439
04/78	38	5,878	5,916
05/78	59	7,136	7,195
06/78	49	6,464	6,513
07/78	44	5,302	5,346
08/78	28	6,470	6,498
09/78	34	5,909	5,943
10/78	24	6,040	6,064
11/78	30	5,747	5,777
12/78	25	5,300	5,325
01/79	40	7,152	7,192
02/79	47	5,199	5,246
03/79	52	7,215	7,267
04/79	49	7,532	7,581
05/79	47	7,930	7,977
06/79	18	6,571	6,589
07/79	27	6,301	6,328
08/79	27	7,959	7,986
MEAN	41	6,265	6,306
MAX	69	7,959	7,986
MIN	18	5,132	5,176
S. D.	14	844	846

Source: Medical Services and Outpatient Morbidity Reports.



	ANNAPOLIS	QUANTICO	PATUXENT
MEAN	10,503	12,123	6,306
MAX	14,692	14,274	7,986
MIN	4,202	8,884	5,176
S.D.	2,324	1,350	846

Figure 2-3. Patient Visits - Outlying Clinics

Table 2-8
PAS SITE SURVEY RESULTS - OUTLYING CLINICS

	<u>NRMC Annapolis</u>	<u>USNA Annapolis *</u>	<u>NRMC Quantico **</u>	<u>Patuxent River</u>
Admin. Staff	2	1	N/A	2
Working Hours	0800-1630	0830-1130 1430-1630	0730-1600	0730-1600
Days Worked	M-F	M-F	M-F	M-F
Peak Days	M, T, W	M, T	M	M, T, F
Peak Hours	0800-1000 1300-1430	None	0800-1100	0730-0900
# Phone Lines	2	1	N/A	11
# Appt. Desks	2	1	N/A	2
Mean Appts./ Month	3,621	275	8,074 ***	7,030
Max Appts./Month	3,830	275	9,506 ***	8,055
Min Appts./Month	3,465	275	5,917 ***	6,450
% No-Shows	8%	.5%	10%	10%
% Cancellations	2%	.5%	5%	10%

N/A = Not Applicable.

* The USNA Branch Clinic at Annapolis handles all visits on a walk-in basis, with the exception of Orthopedics.

** Appointments at NRMC, Quantico are scheduled independently within each clinic, since no central appointing function exists. Approximately two thirds of all visits are appointed.

*** Estimated by applying the two thirds appointing factor to mean, maximum, and minimum patient visits.

Source: Data Automation Site Survey.

2321 appointments per month), with additional workload supporting Pediatrics (averaging 800 per month) and Eye Clinic (averaging 500 per month). Patient visits at USNA peak each July with the introduction of 1300 new plebes, and drop each June following graduation and the departure of cruises. Orthopedic peaks occur in the spring and during football season.

NRMC, Quantico also closed its inpatient areas in June 1979, with a 20 percent workload reduction since this occurrence. These patient visits were mainly lost to DeWitt Army Hospital and civilian facilities (CHAMPUS). The MCDEC Clinic at Mann Hall closed its doors in September 1979, with additional workload loss; some of these patients now impact NRMC, Quantico, and some are lost to other military and civilian facilities. The patient population at NRMC, Quantico, includes a large percentage of active duty beneficiaries, with heavy emphasis on field medicine and training-related accidents. The nature of the active duty population base at Quantico inhibits routine medical calls. Orthopedics and Obstetrics experience especially heavy workloads. Patient visits peak each summer with the arrival of approximately 3300 Officer Candidate School trainees. No CAS area exists at NRMC, Quantico, with each clinic scheduling appointments independently; about two thirds of all visits occur on an appointed basis. The bulk of all patient referrals are directed to DeWitt Army Hospital, including most Emergency Room cases. Calendar year 1979 shows a total of 4163 patient referrals: 2300 to DeWitt Army Hospital, 1300 to NNMC, Bethesda, and the rest to various military and civilian medical treatment facilities.

Naval Hospital, Patuxent River maintains 23 inpatient beds, showing an average daily load of 10.63 patients and a 2.75 day average length of stay for fiscal year 1979. The increasing emphasis on Family Practice has expanded patient visits and services while the beneficiary population base has remained fairly constant. Although 20,000 potential beneficiaries are recorded for Naval Hospital, Patuxent River, humanitarian Emergency Room services are available to the entire county population of 50,000 because of the geographical isolation of this remote outpost. This civilian dependence on the Emergency Room has increased since the opening of the Patuxent River Bridge in 1978. Patient workload peaks during test pilot (and other) training programs, and dips in July because of personnel changes. Approximately 10 percent of the appointment workload involves physical exams; about 200 walk-ins are seen each week. Naval Hospital, Patuxent River also maintains an Occupational Health Center, offering services which include the following:

- Pre-employment physicals
- Annual physicals
- Disability physicals
- Fitness for duty physicals
- Competence for duty physicals
- Asbestos testing

- Sight screening
- Immunizations
- Audiograms
- Communicable disease investigations
- Water sample testing
- Venereal disease followups
- Sanitation inspections

This workload is included in the statistics reported by the Naval Hospital, Patuxent River.

2.3 NEARBY BRANCH CLINICS

Table 2-9 lists patient visit data for nearby Branch Clinic, Arlington Annex and Branch Clinic, Washington Navy Yard. These workload counts are illustrated in Figure 2-4. Additional information pertaining to PAS operations at Arlington and the Navy Yard is presented in Table 2-10, collected from the Data Automation Site Survey of January 1980. These survey sheets appear as Appendix A to this report.

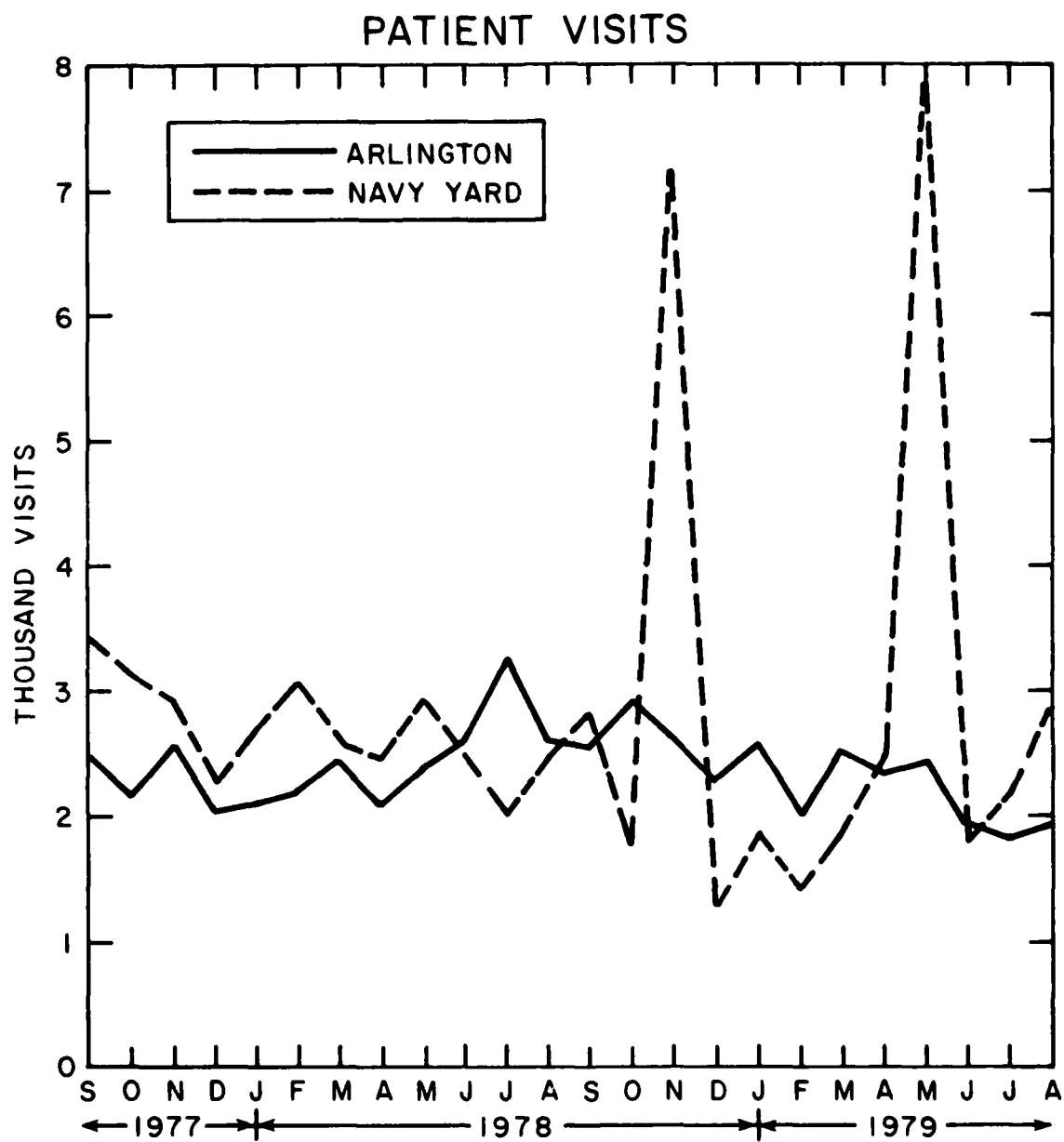
It must be noted that additional regional branch clinics operate in the NNMC area, including: Branch Clinic, Naval Ordnance Station Indian Head; Branch Clinic, Naval Air Facility, Andrews Air Force Base; and Branch Clinic, Naval Research Laboratory. Data have been collected characterizing PAS, Laboratory, Radiology, and Pharmacy operations at these clinics; this information is available through the Navy TRIMIS Office, Bethesda, MD.

The Branch Clinic, Washington Navy Yard operates in an industrial setting, and patient visits peak as a result of occupational health screening and testing. Other peaks occur during flu seasons and in periods before personnel transfers. Monthly walk-ins number about 3000, with monthly appointment cancellations averaging 41. The Branch Clinic, Arlington Annex operates in an administrative setting, with peaks corresponding to flu seasons and personnel transfers. Approximately 800 walk-ins are serviced at the Arlington facility each month.

Table 2-9
PATIENT VISITS - NEARBY BRANCH CLINICS

<u>Month</u>	<u>Arlington</u>	<u>Navy Yard</u>
09/77	2,488	3,452
10/77	2,235	3,104
11/77	2,491	2,976
12/77	2,063	2,307
01/78	2,115	2,686
02/78	2,242	3,084
03/78	2,471	2,556
04/78	2,188	2,425
05/78	2,371	2,860
06/78	2,508	2,450
07/78	3,240	2,011
08/78	2,479	2,418
09/78	2,428	2,790
10/78	2,821	1,682
11/78	2,581	7,193
12/78	2,319	1,315
01/79	2,552	1,875
02/79	2,023	1,469
03/79	2,427	1,912
04/79	2,335	2,425
05/79	2,378	7,849
06/79	1,991	1,819
07/79	1,872	2,278
08/79	1,917	2,761
MEAN	2,356	2,821
MAX	3,240	7,849
MIN	1,872	1,315
S. D.	299	1,547

Source: Medical Services and Outpatient Morbidity Reports.



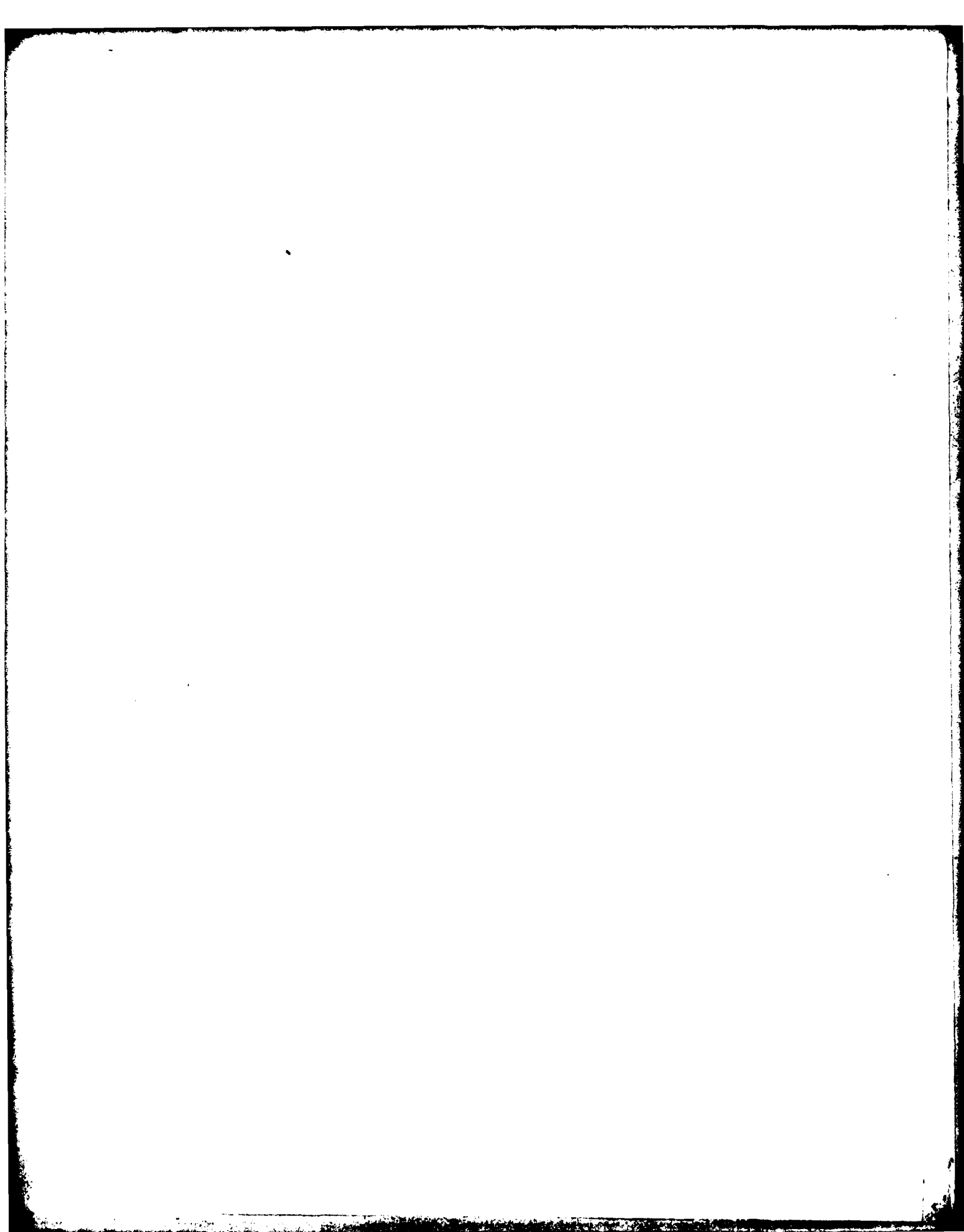
	ARLINGTON	NAVY YARD
MEAN	2,356	2,821
MAX	3,240	7,849
MIN	1,872	1,315
S.D.	299	1,547

Figure 2-4. Patient Visits - Nearby Branch Clinics

Table 2-10
PAS SITE SURVEY RESULTS - NEARBY BRANCH CLINICS

	<u>Arlington</u>	<u>Navy Yard</u>
Admin. Staff	1	1
Working Hours	0800-1600	0715-1545
Days Worked	M-F	M-F
Peak Days	M,T	M,T
Peak Hours	0800-1000 1300-1500	0800-1000
# Phone Lines	3	4
# Appt. Desks	1	1
Mean Appts./Month	1,150	762
Max Appts./Month	1,386	972
Min Appts./Month	924	553
% No-Shows	5%	8.3%
% Cancellations	1%	5.4%

Source: Data Automation Site Survey.



SECTION 3

LABORATORY

3.1 NNMC, BETHESDA

The Laboratory Medicine Service at NNMC, Bethesda is organized along the following lines:

Clinical Pathology Branch

- Clinical Chemistry (including Toxicology and Special Chemistry)
- Microbiology (including Bacteriology, Mycology, Serology, and Virology)
- Hematology
- Blood Bank (including Blood Donor Center)
- Immediate Response Laboratory (Clinical Chemistry and Hematology)
- Computer Applications

Anatomic Pathology Branch

- Surgical Pathology
- Necropsy Pathology
- Cytopathology
- Electron Microscopy
- Pathology Records

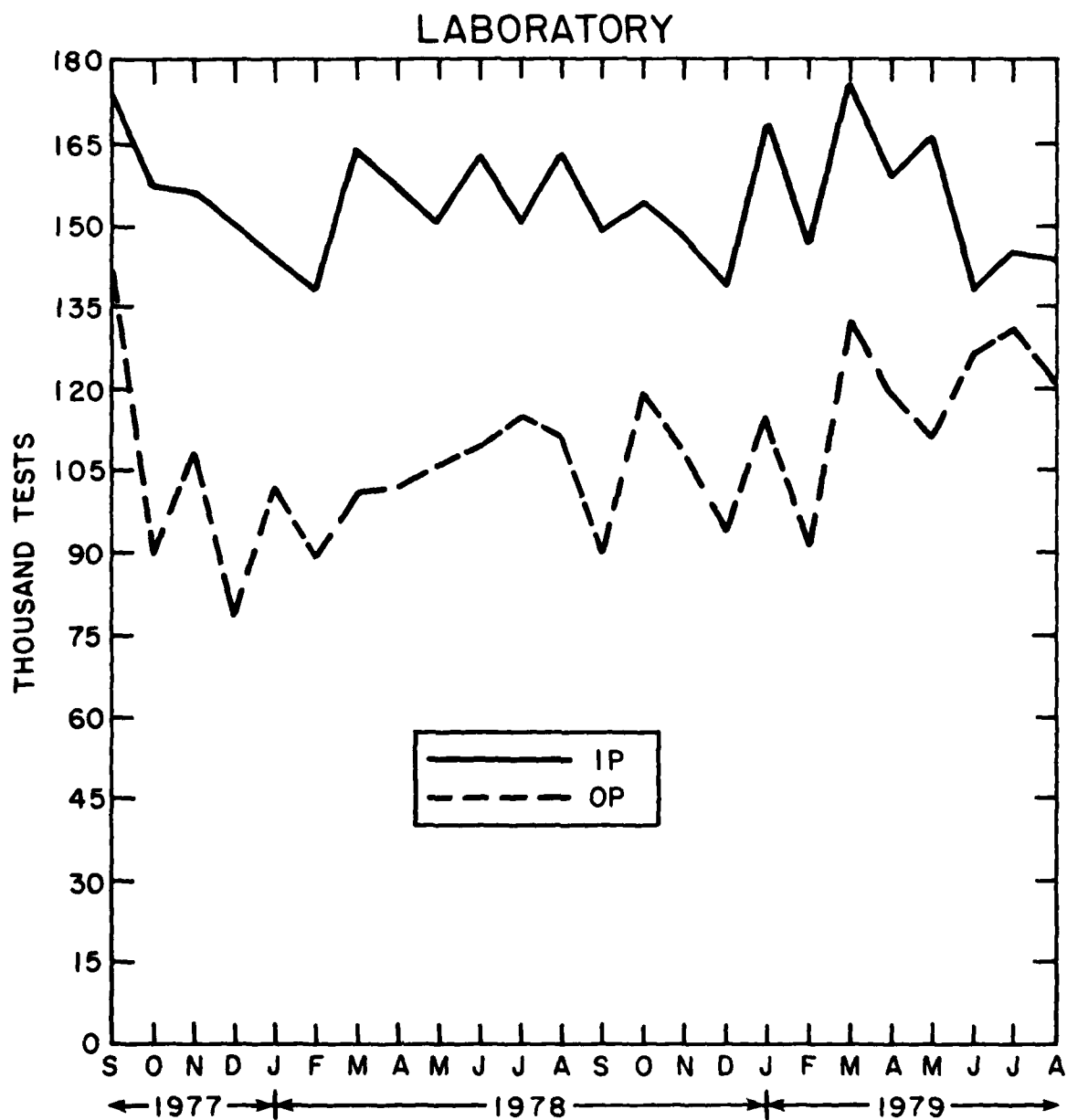
Total laboratory tests from the sections listed above are broken out for both inpatients and outpatients in Table 3-1. These data are charted in Figure 3-1. Mean, maximum, minimum, and standard deviation values for each Laboratory workload area are provided in Table 3-2. Because Clinical Chemistry, Blood Bank, and Microbiology/Serology are responsible for over 80% of the data communications flow, monthly values for these three areas are shown in Table 3-3 and Figure 3-2. Significant increases in workload are commonly related to the census of oncologic and hematologic patients requiring diagnostic studies and blood products, as well as workloads for screening of midshipmen and officer candidates at U.S. Naval Academy and Marine Corps Base, Quantico, respectively. Upper respiratory infections and demands for pre-school physical examinations account for minor peaks in workload.

NNMC currently employs the computer-based Laboratory Information System (LABIS) for accessioning approximately 80% of the specimens received each day. Those

Table 3-1
LABORATORY TESTS - NNMC, BETHESDA

<u>Month</u>	<u>IP Tests</u>	<u>OP Tests</u>	<u>Total</u>
09/77	172,540	142,280	314,820
10/77	157,282	88,908	246,190
11/77	156,558	107,525	264,083
12/77	150,472	78,114	228,586
01/78	145,171	98,948	244,119
02/78	136,708	89,733	226,441
03/78	163,637	103,877	267,514
04/78	157,391	100,351	257,742
05/78	151,606	106,906	258,512
06/78	160,440	109,077	269,517
07/78	150,387	113,537	263,924
08/78	163,714	111,817	275,531
09/78	148,957	89,187	238,144
10/78	155,021	117,095	272,116
11/78	147,506	110,031	257,537
12/78	140,439	92,976	233,415
01/79	167,194	113,932	281,126
02/79	145,342	92,724	238,066
03/79	174,107	134,912	309,019
04/79	159,656	119,009	278,665
05/79	165,859	111,947	277,806
06/79	137,135	126,126	263,261
07/79	145,936	132,143	278,079
08/79	144,795	121,528	266,323
MEAN	154,078	108,862	262,940
MAX	174,107	142,280	314,820
MIN	136,708	78,114	226,441
S. D.	10,471	15,941	22,353

Source: Medical Services and Outpatient Morbidity Reports.



	<u>IP</u>	<u>OP</u>
MEAN	154,078	108,862
MAX	174,107	142,280
MIN	136,708	78,114
S.D.	10,471	15,941

Figure 3-1. Laboratory Tests - NNMC, Bethesda

Table 3-2
LABORATORY TESTS BY DEPARTMENT - NNMC, BETHESDA

	<u>MEAN</u>	<u>MAX</u>	<u>MIN</u>	<u>S.D.</u>
CLINICAL CHEMISTRY				
Inpatient	69,361	82,422	50,898	7,093
Outpatient	56,431	70,388	42,991	8,421
BLOOD BANK				
Inpatient	31,532	42,329	23,827	4,896
Outpatient	16,856	57,727	7,610	9,831
MICROBIOLOGY AND SEROLOGY				
Inpatient	27,729	54,967	17,464	7,199
Outpatient	16,373	19,807	12,696	2,015
HEMATOLOGY				
Inpatient	11,120	17,984	432	4,464
Outpatient	9,413	25,763	2,159	6,306
PATHOLOGY				
Inpatient	12,281	15,474	8,562	5,477
Outpatient	7,379	10,313	3,083	1,761
SPECIAL CHEMISTRY				
Inpatient	3,002	4,851	1,889	824
Outpatient	2,176	3,132	1,062	572
TOXICOLOGY				
Inpatient	570	945	239	196
Outpatient	489	949	281	141

n = 24 months (September 1977 - August 1979).

Source: Monthly Workload Summaries.

Table 3-3
MAJOR LABORATORY WORKLOADS
BY DEPARTMENT - NNMCM, BETHESDA

<u>Month</u>	<u>Clinical Chemistry</u>	<u>Blood Bank</u>	<u>Microbiology and Serology</u>
09/77	118,526	81,738	70,418
10/77	121,299	39,458	38,715
11/77	134,350	41,920	41,878
12/77	115,450	36,533	35,896
01/78	129,949	34,901	35,417
02/78	113,217	36,424	37,075
03/78	131,266	41,717	45,812
04/78	130,800	38,053	46,648
05/78	128,554	42,970	44,984
06/78	127,592	53,909	47,702
07/78	135,864	48,679	40,126
08/78	144,216	44,857	44,394
09/78	121,325	38,177	37,763
10/78	122,509	55,426	40,130
11/78	118,559	48,391	41,439
12/78	94,072	52,022	46,975
01/79	128,803	53,412	52,643
02/79	117,102	40,441	35,291
03/79	151,539	64,288	43,851
04/79	130,701	52,391	46,105
05/79	126,942	54,956	48,731
06/79	117,749	54,500	47,989
07/79	133,503	56,394	43,597
08/79	125,571	49,743	44,871
MEAN	125,792	48,388	44,102
MAX	151,539	81,738	70,418
MIN	94,072	34,901	35,291
S.D.	11,277	10,619	7,286

Source: Monthly Workload Summaries.

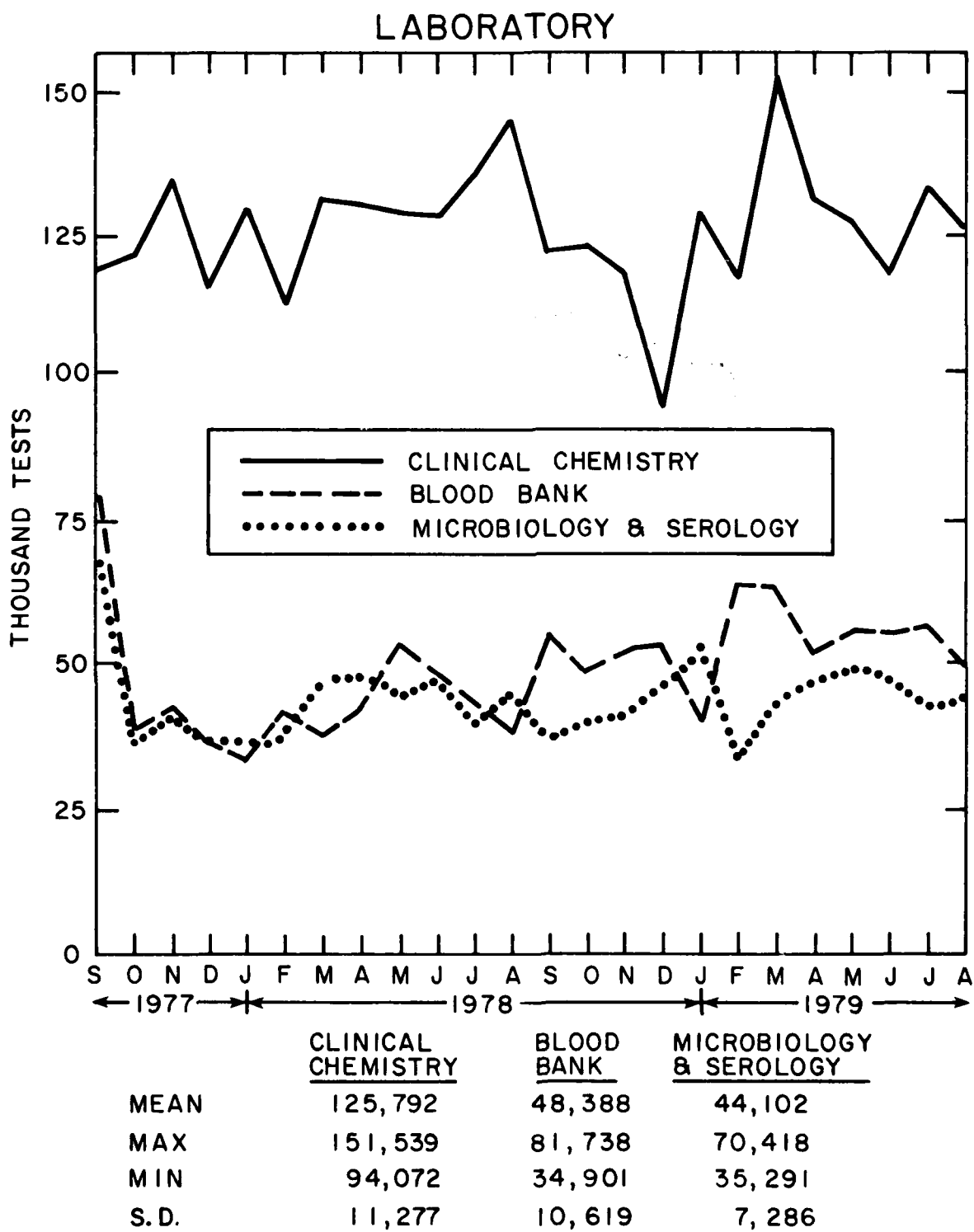


Figure 3-2. Major Laboratory Workloads by Department -
NNMC, Bethesda

services which currently operate on an entirely manual basis include the Anatomic Pathology Branch, a portion of the Blood Bank, and a segment of Microbiology. All specimens received from outlying and nearby branch clinics and most of those entering the Clinical Pathology Branch are accessioned through LABIS. The following estimates have been provided by Laboratory administrative sources:

- Specimens accessioned through LABIS = 2000 per day
- Specimens accessioned manually = 500 per day
- Total specimens accessioned = 2500 per day
- Average tests per specimen = 5
- Average tests performed = 12,500 per day
- Average tests performed = 250,000 per month
- Quality control, calibration, and proficiency testing (10% of total) = 25,000 per month
- Total tests performed = 275,000 per month

These counts compare favorably with the figures recorded in Table 3-1 (averaging 262,940 tests per month). It is difficult to estimate the actual number of patients served by the Laboratory, because some patients require one specimen and others must provide several. Similarly, one test request may generate any number of actual procedures (i.e., one CBC request generates 7 test results, and one SMA 12/60 produces 12 test results). Unless otherwise noted, all Laboratory statistics refer to test results.

LABIS operations employ 15 CRTs on the wards and 4 printers. Approximately 2500-3000 General Test Records (GTRs) are handled through LABIS each day; each GTR may produce any number of actual test results, and multiple GTRs may be provided for a given specimen. Over 21,000 patients are recorded in active files, and over 120,000 patient files (not actual patients) are stored on tape.

Operations in the Anatomic Pathology Branch include the manual processing of 15,000 specimens each year in the Anatomic and Surgical Pathology sections; in these areas, only one specimen is usually received from each patient. Approximately 250 autopsies are also performed each year. In the Cytology section, one specimen corresponds to one test request, producing one test result. Approximately 5% of all tests produce atypical results.

NNMC Laboratory presents a unique situation with its national teaching, research, and service operations. The Toxicology Unit, Clinical Chemistry Section, is responsible for clinical and forensic toxicology, including evaluation of drug overdoses, autopsies, and therapeutic drug monitoring. Therapeutic drug monitoring and toxicologic studies of patients with drug overdoses require not only a communications system with rapid turnaround time, but also access to the physician providing care to the patient. Toxicologic studies also require chain-of-custody for reports with an audit

trail and communications systems which assure confidentiality. The North Eastern Regional Blood Bank is also headquartered at NNMC, Bethesda, offering sophisticated techniques in the preparation of blood components and frozen blood. The Laboratory operates a worldwide Histopathology Center for ships and foreign stations. Liaison is also provided for the Oral Histopathology Service of the National Naval Dental Center. Training programs are offered in conjunction with the Naval School of Health Services for the following categories:

- Residency in Pathology
- Advanced Residency in Hematopathology
- Medical Technologist Program
- Medical Laboratory Technician Program
- Cytotechnician Program

The following deficiencies have been noted in the Laboratory data communications environment:

- Transmittal of emergency Laboratory test results by telephone, or other communications methods, to the Emergency Room, Intensive Care Unit, operating rooms, wards, or clinics.
- Transmittal of routine Laboratory test results to remote sites, including hospitals, branch clinics, or dispensaries within the medical region of the National Naval Medical Center.
- Improved data communications methods for transmittal of routine and urgent Laboratory reports, as well as reports to physicians, from the Laboratory Medicine Service to wards and clinics. At the present time, these reports are delivered by messenger to the site listed on the report, but there is no assurance that the location of the patient is correct, or that the report is placed in the clinical record of the patient in a timely manner.
- Transmittal of reports of tissue examinations from the Anatomic Pathology Branch to wards, clinics, and remote medical facilities.

Another challenge involves the return of Laboratory test results to the correct patient file. This data transfer problem is compounded when a patient changes from outpatient to inpatient status, or moves to a different location within the hospital. Consider the case of an outpatient who is admitted to NNMC, Bethesda through a clinic, is assigned to a ward, goes to the Operating Room for surgical procedures, and remains in the Intensive Care Unit before transfer back to the original ward. In this case, Laboratory specimens may have been collected at each step along the patient's route, with test results likely to be returned to any of the above mentioned locations. This data communications lag results in duplicate testing, wasting time and money. However, LABIS provides a means for rapid transfer of a patient in the hospital census, and it offers a

method to transmit reports directly to the site at which the patient is currently receiving care. Other holdups in Laboratory data communications are caused by incomplete and/or incorrect test request forms, one patient using another person's medical identification card, the mistaken recording of a dependent's social security number, etc. The role of NNMC as a major teaching facility leads to multiple determinations ("overkill") of one patient's condition by various health care providers, especially in the Intensive Care Unit, the Coronary Care Unit, and the Emergency Room.

The NNMC Laboratory provides the following specimen accessioning stations:

- Main Laboratory and Immediate Response Laboratory
- Microbiology
- Blood Bank
- Blood Donor Center
- Outpatient and Hematology/Oncology

The Main Laboratory accessioning station also receives specimens from the staff phlebotomists who collect inpatient samples on the wards daily from 0600-0800. Ambulatory inpatients appear in person at the appropriate accessioning location. Normal operating hours for the Laboratory are 0800-1630, Monday through Friday, and 0800-1200, Saturday. At all other times, technical personnel are assigned to watches in the Immediate Response Laboratory Unit and the Blood Bank. Current, on-board staffing parameters are provided below; note that only 65% of all enlisted billets are currently filled.

- Pathologists (Officer) = 7
- Resident Pathologists (Officer) = 16
- Allied Scientists (Officer) = 8
- Administration (Officer) = 5
- Corpsmen, General Service (Enlisted) = 10
- Laboratory Technicians (Enlisted) = 6
- Histopathology Technicians (Enlisted) = 2
- Transplant Technicians (Enlisted) = 2
- Advanced Medical Laboratory Technicians (Enlisted) = 41

- Medical Technologists (Enlisted) = 16
- Medical Laboratory Technicians (Civilian) = 9
- Medical Technologists (Civilian) = 25
- Medical Technician Technologists (Civilian) = 4
- Museum Specialist (Civilian) = 1
- Autopsy Assistant (Civilian) = 1
- Laboratory Worker (Civilian) = 1
- Administration (Civilian) = 11

3.2 OUTLYING CLINICS

Laboratory tests for the Annapolis Clinics are presented in Table 3-4, the Quantico Clinics in Table 3-5, and Naval Hospital, Patuxent River in Table 3-6. These data are plotted in Figure 3-3. The tests referred to NNMC for processing are also reflected in these statistics. Additional data related to Laboratory operations at these three major outlying clinics (including referrals) are shown in Table 3-7. These facilities refer all anatomical pathology and special study requests to NNMC, Bethesda.

All Laboratory specimens accessioned within the USNA Clinic at Bancroft Hall are referred to NRMC, Annapolis for processing; the workload units, however, are reflected in the USNA statistics. Pre-commission physicals contribute to peak Laboratory workloads, as does the post-Christmas vacation flu season with its assortment of viral infections brought by the midshipmen from across the country. The erratic workload at Quantico reflects the numerous training programs which impact this facility at various times of the year. Laboratory referrals from Quantico are directed to NNMC rather than DeWitt Army Hospital. The increasing emphasis on Family Practice at Naval Hospital, Patuxent River has resulted in increasing Laboratory tests for this facility. Workload originating from the Patuxent River Occupational Health Center also impacts the Laboratory data communications environment. Direct LABIS interface is provided to Patuxent River, while LABIS computer printouts are available to NRMC, Annapolis and NRMC, Quantico.

Outlying facilities do not refer all blood bank requests to NNMC. Naval Hospital, Patuxent River has the capabilities to provide crossmatches and compatibility studies. In the event of contingency, remote facilities may be able to procure blood from donors. Communications with Naval Hospital, Patuxent River are essential for arrangement for shipment. For emergency and contingency requirements, the basic inventory of blood products at Naval Hospital, Patuxent River may not be adequate. Improved communications systems are required for these remote regional medical facilities.

Table 3-4
LABORATORY TESTS - ANNAPOLIS CLINICS

<u>Month</u>	<u>NRMC</u>	<u>USNA</u>	<u>Total</u>
09/77	15,358	0	15,358
10/77	14,137	0	14,137
11/77	16,084	0	16,084
12/77	12,284	460	12,744
01/78	15,484	841	16,325
02/78	14,898	934	15,832
03/78	15,226	1,682	16,908
04/78	17,514	2,460	19,974
05/78	20,553	1,132	21,685
06/78	12,857	590	13,447
07/78	9,712	1,517	11,229
08/78	15,366	2,165	17,531
09/78	14,124	3,593	17,717
10/78	17,746	871	18,617
11/78	18,347	621	18,968
12/78	15,861	295	16,156
01/79	24,015	802	24,817
02/79	18,560	289	18,849
03/79	21,212	618	21,830
04/79	20,211	701	20,912
05/79	18,944	461	19,405
06/79	12,977	406	13,383
07/79	16,235	1,517*	17,752*
08/79	15,346	706	16,052
MEAN	16,377	944	17,321
MAX	24,015	3,593	24,817
MIN	9,712	0	11,229
S.D.	3,198	855	3,213

*Estimated.

Source: Medical Services and Outpatient Morbidity Reports.

Table 3-5
LABORATORY TESTS - QUANTICO CLINICS

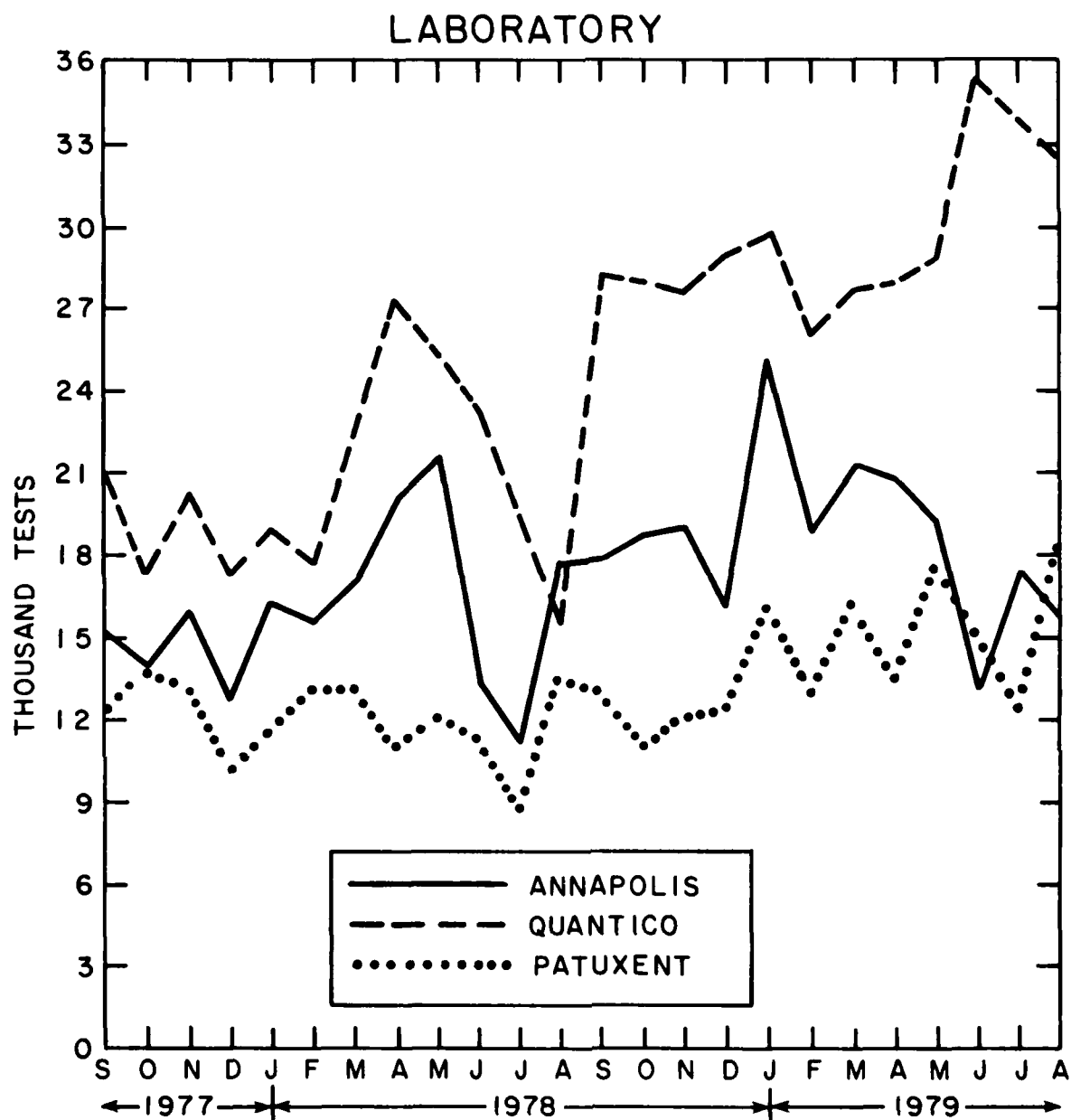
<u>Month</u>	<u>NRMC</u>	<u>MCDEC</u>	<u>Total</u>
09/77	18,128	3,113	21,241
10/77	15,944	1,295	17,239
11/77	17,970	2,253	20,223
12/77	15,411	1,905	17,316
01/78	16,492	2,422	18,914
02/78	15,014	2,635	17,649
03/78	20,476	2,207	22,683
04/78	25,249	1,941	27,190
05/78	22,571	2,626	25,197
06/78	14,916	8,275	23,191
07/78	13,957	5,145	19,102
08/78	12,485	2,939	15,424
09/78	24,609	3,775	28,384
10/78	24,808	3,256	28,064
11/78	25,865	1,822	27,687
12/78	26,877	2,037	28,914
01/79	25,904	3,922	29,826
02/79	22,734	2,924	25,658
03/79	24,799	2,517	27,316
04/79	25,369	2,510	27,879
05/79	26,116	2,583	28,699
06/79	28,886	6,363	35,249
07/79	30,042	3,765	33,807
08/79	30,042	2,437	32,479
MEAN	21,861	3,111	24,972
MAX	30,042	8,275	35,249
MIN	12,485	1,295	15,424
S. D.	5,480	1,558	5,596

Source: Medical Services and Outpatient Morbidity Reports.

Table 3-6
LABORATORY TESTS - NAVAL HOSPITAL, PATUXENT RIVER

<u>Month</u>	<u>IP Tests</u>	<u>OP Tests</u>	<u>Total</u>
09/77	3,021	9,372	12,393
10/77	4,696	8,860	13,556
11/77	3,867	9,407	13,274
12/77	2,981	7,126	10,107
01/78	4,357	7,558	11,915
02/78	2,989	9,969	12,958
03/78	2,538	10,738	13,276
04/78	2,330	8,726	11,056
05/78	2,313	9,809	12,122
06/78	1,680	9,532	11,212
07/78	1,908	7,068	8,976
08/78	3,023	10,472	13,495
09/78	3,708	9,471	13,179
10/78	2,215	9,004	11,219
11/78	3,063	9,040	12,103
12/78	4,421	8,084	12,505
01/79	7,491	8,734	16,225
02/79	3,989	8,977	12,966
03/79	4,762	11,530	16,292
04/79	4,202	9,365	13,567
05/79	4,820	12,447	17,267
06/79	4,363	10,217	14,580
07/79	3,483	9,140	12,623
08/79	4,602	13,760	18,362
MEAN	3,618	9,517	13,135
MAX	7,491	13,760	18,362
MIN	1,680	7,068	8,976
S. D.	1,272	1,533	2,182

Source: Medical Services and Outpatient Morbidity Reports.



	<u>ANNAPOLIS</u>	<u>QUANTICO</u>	<u>PATUXENT</u>
MEAN	17,321	24,972	13,135
MAX	24,817	35,249	18,362
MIN	11,229	15,424	8,976
S.D.	3,213	5,596	2,182

Figure 3-3. Laboratory Tests - Outlying Clinics

Table 3-7
LABORATORY SITE SURVEY RESULTS - OUTLYING CLINICS

	<u>NRMC Annapolis</u>	<u>USNA Annapolis*</u>	<u>NRMC Quantico</u>	<u>Patuxent River</u>
Health Care Providers	4	0	5	5
Admin. Staff	0	0	1	0
Working Hours	0800-1630 0800-1200	0	0730-1600	0730-1600
Days Worked	M-Sa	0	M-F	M-Su
Peak Days	M, T, W	0	M, W	T, Th
Peak Hours	0800-1200	0	0730-0900 1430-1600	0730-0900 1300-1430
Accessioning Stations	8	0	1	2
Mean Referrals to NNMC/Month	500	0	900	300
Max Referrals to NNMC/Month	2,219	0	1,200	500
Min Referrals to NNMC/Month	320	0	750	250

*All Laboratory specimens are referred to NRMC, Annapolis for processing, with the exception of one or two tests per month.

Source: Data Automation Site Survey.

3.3 NEARBY BRANCH CLINICS

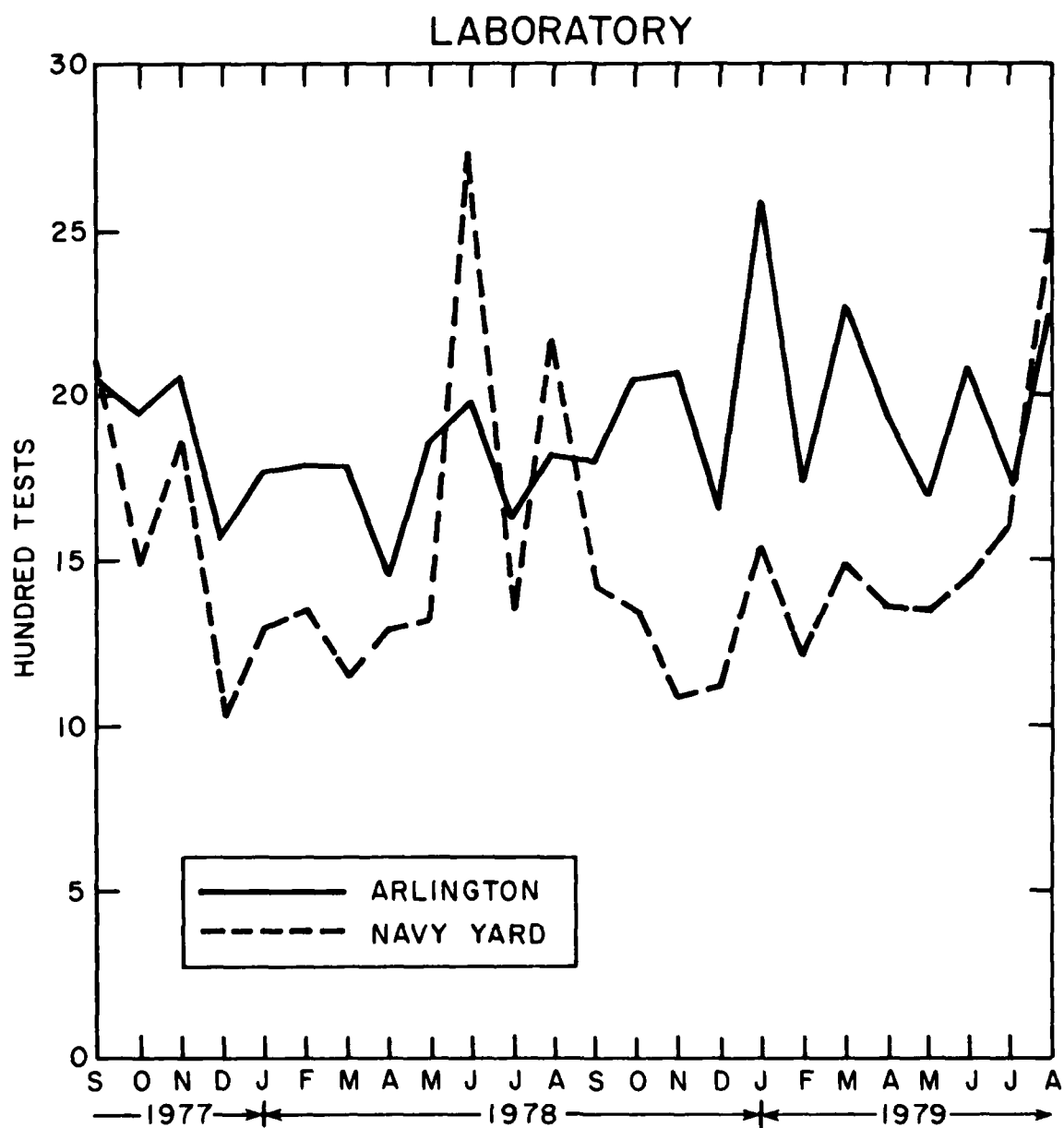
Table 3-8 presents Laboratory test workloads for Branch Clinic, Arlington Annex and Branch Clinic, Washington Navy Yard. These trends are illustrated in Figure 3-4. Other Laboratory workload parameters for these nearby branch clinics are shown in Table 3-9.

All anatomic, immunohematologic, and special study requests from these two facilities are referred to NNMC for processing. The Arlington Annex records 1423 specimens each month, while the Navy Yard records an average of 1406 accessioned specimens. Laboratory peak demands correspond to flu seasons, summer personnel changes, and school physicals.

Table 3-8
LABORATORY TESTS - NEARBY BRANCH CLINICS

<u>Month</u>	<u>Arlington</u>	<u>Navy Yard</u>
09/77	2,045	2,100
10/77	1,953	1,477
11/77	2,065	1,844
12/77	1,569	1,020
01/78	1,758	1,297
02/78	1,769	1,593
03/78	1,766	1,140
04/78	1,391	1,292
05/78	1,847	1,311
06/78	1,962	2,708
07/78	1,613	1,326
08/78	1,803	2,146
09/78	1,783	1,418
10/78	2,055	1,347
11/78	2,098	1,093
12/78	1,657	1,101
01/79	2,595	1,540
02/79	1,720	1,207
03/79	2,268	1,487
04/79	1,915	1,339
05/79	1,694	1,328
06/79	2,084	1,404
07/79	1,724	1,592
08/79	2,282	2,494
MEAN	1,892	1,525
MAX	2,595	2,708
MIN	1,391	1,020
S. D.	265	436

Source: Medical Services and Outpatient Morbidity Reports.



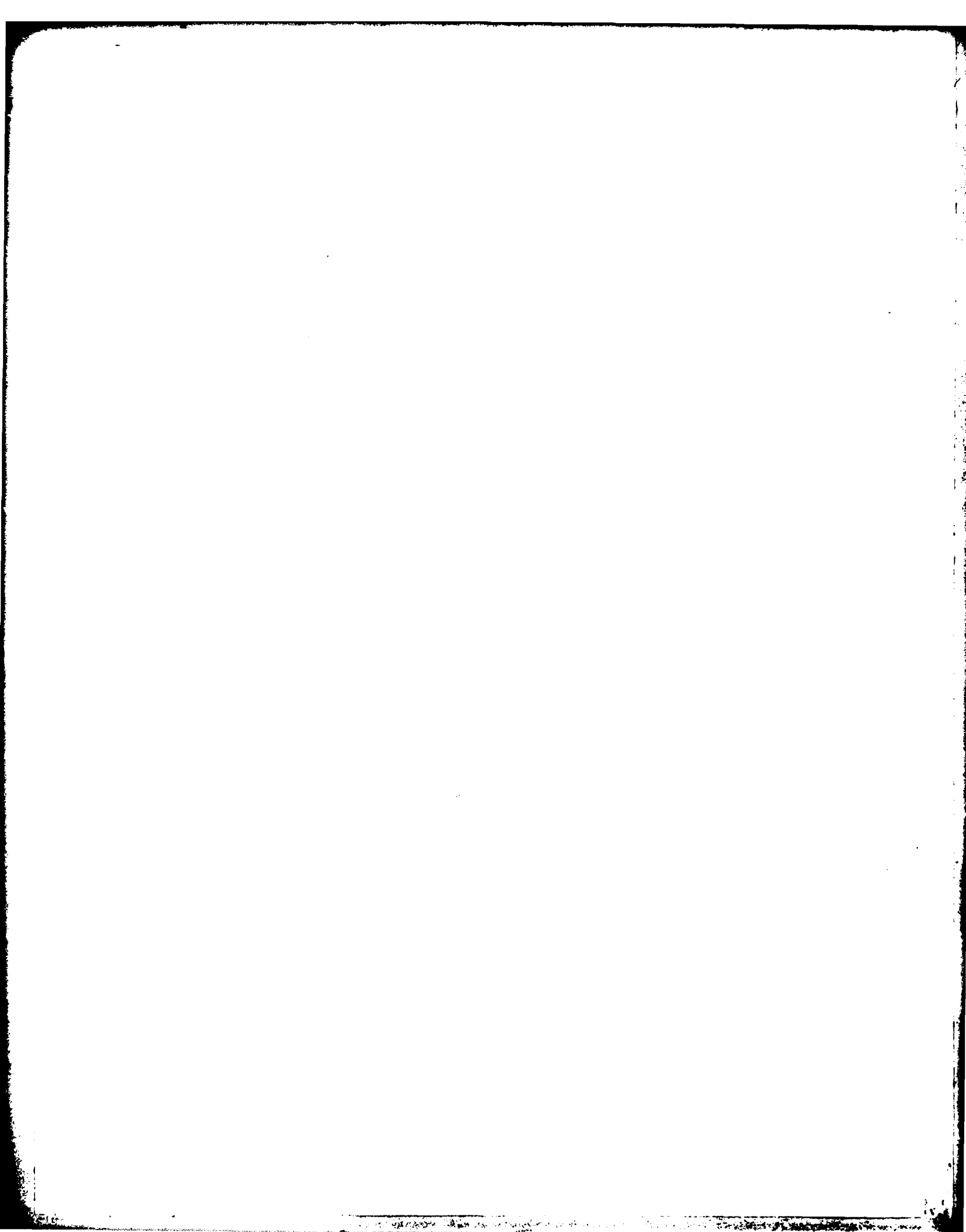
	ARLINGTON	NAVY YARD
MEAN	1,892	1,525
MAX	2,595	2,708
MIN	1,391	1,020
S.D.	265	436

Figure 3-4. Laboratory Tests - Nearby Branch Clinics

Table 3-9
LABORATORY SITE SURVEY RESULTS - NEARBY BRANCH CLINICS

	<u>Arlington</u>	<u>Navy Yard</u>
Health Care Providers	2	2
Admin. Staff	0	0
Working Hours	0800-1600	0715-1545
Days Worked	M-F	M-F
Peak Days	M,T	M,T,W
Peak Hours	0800-1000 1300-1500	0715-1200
Accessioning Stations	1	1
Mean Referrals to NNMC/Month	638	150
Max Referrals to NNMC/Month	779	250
Min Referrals to NNMC/Month	497	100

Source: Data Automation Site Survey.



SECTION 4

RADIOLOGY

4.1 NNMC, BETHESDA

Radiology operations at NNMC encompass three basic structural entities:

- Radiographic Imaging (CT Scan, Ultrasound, and Nuclear Medicine sections)
- Radiation Therapy
- Diagnostic Radiology (Main, Outpatient, Orthopedic, Mammography, and Angiography sections)

Each of these areas schedules workload and appointments independently, with the Orthopedic and Outpatient sections providing all services on a walk-in basis. These operations are currently housed in Tower 2, Tower 4, and Building 8.

Monthly exposure counts are listed in Table 4-1 and charted in Figure 4-1. Since 1 April 1978, these counts have reflected the actual number of exposures required for a given procedure (i.e., one chest procedure equals three exposures, one gallbladder procedure equals seven exposures). Prior to 1 April 1978, these exposure counts were obtained by multiplying the number of patient visits by a constant factor. The statistics relating to Radiology special studies, as shown in Table 4-2, are based upon the actual number of procedures performed.

Department-wide procedure and exposure data are now tallied every three months, with the period from October through December 1979 experiencing 23,639 procedures and 115,509 exposures, for a ratio of 4.9 exposures per procedure. Approximately 88,000 Radiology procedures are performed each year, each impacting the data communications environment. It is estimated that an average patient visit generates 1.6 procedures, with the exception of Nuclear Medicine and Radiation Therapy. Both inpatient and outpatient visits to Nuclear Medicine require an average of 1.5 procedures. Radiation Therapy generates 1.4 procedures per inpatient visit and 1.3 procedures per outpatient visit.

An average of 200,000 Master Film File Folders are maintained at various locations within NNMC, with up to 250,000 folders in house before the yearly archival process (based on the factor of 40 jackets per linear foot). An additional 40,000 films are located in the Radiology teaching file. Approximately 1800 new file folders are created each month. NNMC, Bethesda supports a population of about 600 potential film borrowers, with approximately 84,000 film loan requests each year. Some checkout and teaching file films may soon be minified to 8" x 10" and 35mm slide formats. Silver contained in all films is recycled after a five year film retention period. The Pharmacy supplies Radiology with required contrast agents, supplies, and drugs.

A major problem in the data communications environment involves the length of time required for Radiology reports to enter the patient's file. The turnaround time

Table 4-1
RADIOLOGY EXPOSURES - NNMC, BETHESDA

<u>Month</u>	<u>IP Exposures</u>	<u>OP Exposures</u>	<u>Total</u>
09/77	12,387	20,370	32,757
10/77	11,989	23,742	35,731
11/77	11,574	22,605	34,179
12/77	8,468	11,654	20,122
01/78	6,229	14,113	20,342
02/78	6,879	11,015	17,894
03/78	12,086	10,350	22,436
04/78	6,346	18,432	24,778
05/78	7,617	19,259	26,876
06/78	7,315	22,004	29,319
07/78	11,148	18,378	29,526
08/78	14,417	24,133	38,550
09/78	17,473	20,358	37,831
10/78	17,346	24,462	41,808
11/78	15,371	21,762	37,133
12/78	14,944	21,902	36,846
01/79	20,141	25,217	45,358
02/79	19,525	13,715	33,240
03/79	12,175	22,434	34,609
04/79	14,397	21,746	36,143
05/79	18,014	22,119	40,133
06/79	12,799	34,016	46,815
07/79	19,139	19,337	38,476
08/79	17,491	15,460	32,951
MEAN	13,136	19,941	33,077
MAX	20,141	34,016	46,815
MIN	6,229	10,350	17,894
S. D.	4,405	5,317	7,818

Source: Medical Services and Outpatient Morbidity Reports.

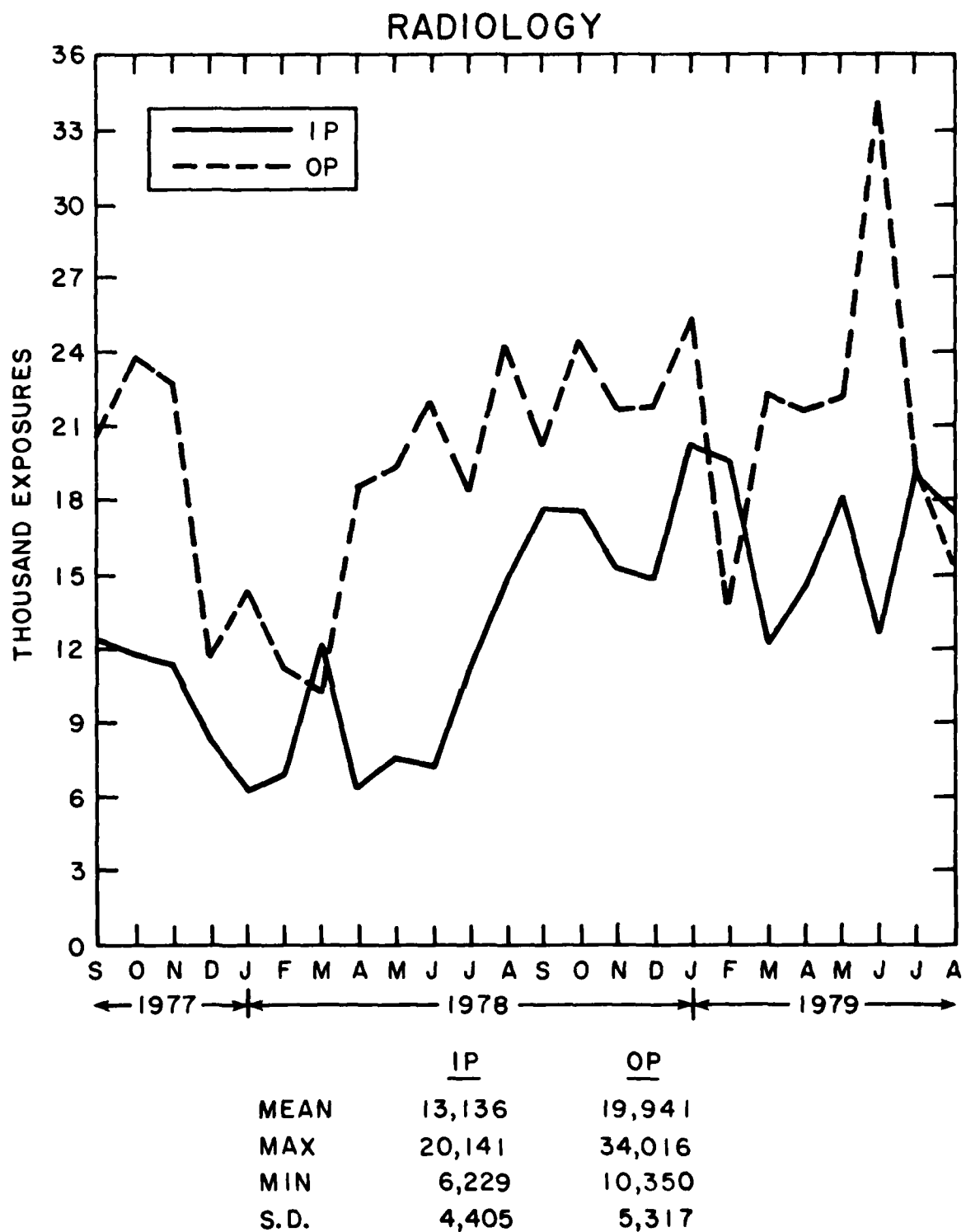


Figure 4-1. Radiology Exposures - NNMCC, Bethesda

Table 4-2
RADIOLOGY SPECIAL STUDIES - NNMC, BETHESDA

	<u>MEAN</u>	<u>MAX</u>	<u>MIN</u>	<u>S.D.</u>
RADIOISOTOPE STUDIES				
Inpatient	1,818	2,920	1,128	492
Outpatient	2,460	4,079	1,298	863
COBALT/CESIUM				
Inpatient	432	707	246	126
Outpatient	294	554	103	112
FLUOROSCOPIC EXAMS				
Inpatient	223	695	35	83
Outpatient	442	626	76	118
RADIUM & RADIOISOTOPE THERAPY				
Inpatient	<1	4	0	1
Outpatient	0	0	0	0
OTHER DEEP THERAPY				
Inpatient	<1	4	0	1
Outpatient	<1	1	0	<1

n = 24 months (September 1977 - August 1979).

Source: Medical Services and Outpatient Morbidity Reports.

between the actual performance of a procedure and the resulting report varies from 3 days to 3 weeks. Because of this time lag, virtually all films are "wet read," contrary to fundamental system principles. This practice also causes numerous walk-in and telephone queries regarding these "wet" results, adding further demands to the communications environment. Films referred from outlying and nearby branch facilities are generally read the same day they are presented to NNMC, resulting in a hand-written report and a generally rapid turnaround time.

The existing Radiology Department at NNMC, Bethesda offers 15 rooms and 6 accessioning points; the Replacement Hospital will provide 28 rooms and 5 accessioning points: Main X-ray, Nuclear Medicine, Radiation Therapy, Special Procedures, and Orthopedics. An additional 30-40 procedures per day are performed with portable equipment, usually in the Intensive Care Unit, the Coronary Care Unit, or the Operating Room. Regular operating hours run from 0800-1630, Monday through Friday; after hours emergencies are handled by duty personnel. Staffing for the Radiology Department is as follows:

- Administrative Physicists = 5
- Administrative Clerks = 12
- Staff Radiologists = 10
- Resident Staff Radiologists = 18
- Nuclear Medicine Physicians = 2
- Resident Nuclear Medicine Physicians = 3
- Radiotherapists = 2
- Therapy Radiologists = 3
- Therapist = 1
- X-ray Technicians = 25
- Nuclear Medicine Technicians = 9
- Biochemist = 1
- LPN = 1

4.2 OUTLYING CLINICS

Radiology exposure data from the three major outlying clinics are presented in Table 4-3 (Annapolis), Table 4-4 (Quantico), and Table 4-5 (Patuxent River). These data are plotted in Figure 4-2. Referrals from the outlying clinics are included in these statistics. Additional information concerning Radiology operations is displayed in Table 4-6.

Table 4-3
RADIOLOGY EXPOSURES - ANNAPOLIS CLINICS

<u>Month</u>	<u>NRMC</u>	<u>USNA</u>	<u>Total</u>
09/77	3,453	714	4,167
10/77	2,477	550	3,027
11/77	3,567	602	4,169
12/77	2,886	331	3,217
01/78	3,583	632	4,215
02/78	3,113	783	3,896
03/78	3,571	720	4,291
04/78	4,302	1,257	5,559
05/78	1,225	766	1,991
06/78	2,497	281	2,778
07/78	3,096	607	3,703
08/78	3,212	688	3,900
09/78	3,631	1,033	4,664
10/78	3,211	821	4,032
11/78	2,823	613	3,436
12/78	1,865	213	2,078
01/79	3,232	582	3,814
02/79	3,455	531	3,986
03/79	1,336	667	2,003
04/79	4,372	772	5,144
05/79	4,127	880	5,007
06/79	844	263	1,107
07/79	2,432	607*	3,039*
08/79	3,139	1,041	4,180
MEAN	2,977	665	3,642
MAX	4,372	1,257	5,559
MIN	844	213	1,107
S. D.	922	248	1,081

*Estimated.

Source: Medical Services and Outpatient Morbidity Reports.

Table 4-4
RADIOLOGY EXPOSURES - QUANTICO CLINICS

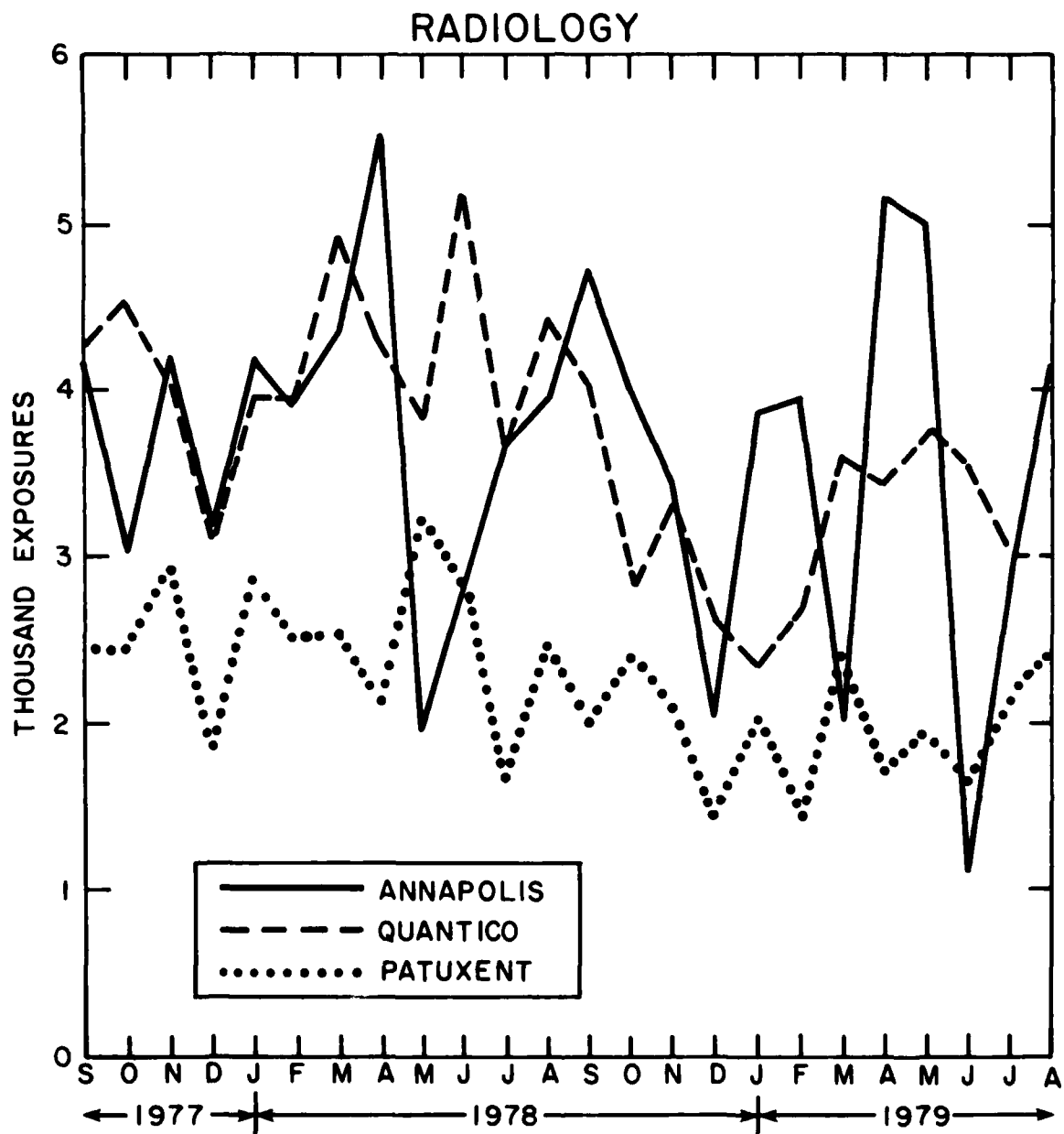
<u>Month</u>	<u>NRMC</u>	<u>MCDEC</u>	<u>Total</u>
09/77	2,568	1,679	4,247
10/77	3,165	1,458	4,623
11/77	2,842	1,272	4,114
12/77	2,233	961	3,194
01/78	2,674	1,281	3,955
02/78	2,601	1,343	3,944
03/78	3,064	1,824	4,888
04/78	2,859	1,393	4,252
05/78	2,319	1,487	3,806
06/78	2,819	2,313	5,132
07/78	1,762	1,930	3,692
08/78	2,927	1,479	4,431
09/78	2,133	1,910	4,043
10/78	2,205	556	2,761
11/78	2,219	1,069	3,288
12/78	1,888	743	2,631
01/79	1,179	1,130	2,309
02/79	1,737	948	2,685
03/79	2,518	1,075	3,593
04/79	2,429	968	3,397
05/79	2,596	1,146	3,742
06/79	2,389	1,177	3,555
07/79	1,839	1,166	3,005
08/79	1,388	1,611	2,999
MEAN	2,348	1,331	3,679
MAX	3,165	2,313	5,132
MIN	1,179	556	2,309
S. D.	516	406	734

Source: Medical Services and Outpatient Morbidity Reports.

Table 4-5
RADIOLOGY EXPOSURES - NAVAL HOSPITAL, PATUXENT RIVER

<u>Month</u>	<u>IP Exposures</u>	<u>OP Exposures</u>	<u>Total</u>
09/77	74	2,411	2,485
10/77	121	2,305	2,426
11/77	172	2,707	2,879
12/77	595	1,292	1,887
01/78	110	2,734	2,844
02/78	80	2,458	2,538
03/78	44	2,513	2,557
04/78	10	2,164	2,174
05/78	167	3,060	3,227
06/78	59	2,790	2,849
07/78	65	1,614	1,679
08/78	84	2,386	2,470
09/78	79	1,950	2,029
10/78	70	2,318	2,388
11/78	145	1,980	2,125
12/78	70	1,337	1,407
01/79	84	2,002	2,086
02/79	86	1,373	1,459
03/79	63	2,332	2,395
04/79	31	1,686	1,717
05/79	68	1,833	1,901
06/79	57	1,578	1,635
07/79	79	2,068	2,147
08/79	114	2,316	2,430
MEAN	105	2,134	2,239
MAX	595	3,060	3,227
MIN	10	1,292	1,407
S. D.	111	483	472

Source: Medical Services and Outpatient Morbidity Reports.



	<u>ANNAPOLIS</u>	<u>QUANTICO</u>	<u>PATUXENT</u>
MEAN	3,642	3,679	2,239
MAX	5,559	5,132	3,227
MIN	1,107	2,309	1,407
S.D.	1,081	734	472

Figure 4-2. Radiology Exposures - Outlying Clinics

Table 4-6
RADIOLOGY SITE SURVEY RESULTS - OUTLYING CLINICS

	<u>NRMC Annapolis</u>	<u>USNA Annapolis</u>	<u>NRMC Quantico</u>	<u>Patuxent River</u>
Health Care Providers	3	1	3	3
Admin. Staff	0	0	0	0
Working Hours	0745-1630 0745-1200	0700-1100 1230-1600	0730-1600	0730-1600
Days Worked	M-Sa	M-F	M-F	M-F
Peak Days	M,W	M,Th	M,F	M,T,W,Th
Peak Hours	0830-1130 1330-1500	0730-1100	0900-1100	0800-1130 1300-1400
Exam Rooms	4	1	3	2
Mean Referrals to NNMC/Month	0	0	2	14
Max Referrals to NNMC/Month	0	0	8	20
Min Referrals to NNMC/Month	0	0	1	9

Source: Data Automation Site Survey.

Annapolis Radiology workload is heavily impacted by the year-round compulsory sports program at USNA. Although most of this workload is handled at Bancroft Hall, last year 63 midshipmen sought treatment at the NRMC for various special procedures, head injuries, and other traumas. Pre-commission physicals also increase Radiology demand. A civilian radiologist is available part-time for radiographic interpretations.

Radiology operations at Quantico respond to the demands of field practice injuries, with heavy Orthopedics emphasis. Quantico Radiology referrals are usually directed to DeWitt Army Hospital rather than NNMC, Bethesda. Approximately 100,000 film files are maintained at NRMC, Quantico.

Naval Hospital, Patuxent River sees a large Radiology workload as a result of softball, football, and other intramural sports groups. The adjacent Occupational Health Center also employs radiographic services in its preventive medicine and environmental health programs.

4.3 NEARBY BRANCH CLINICS

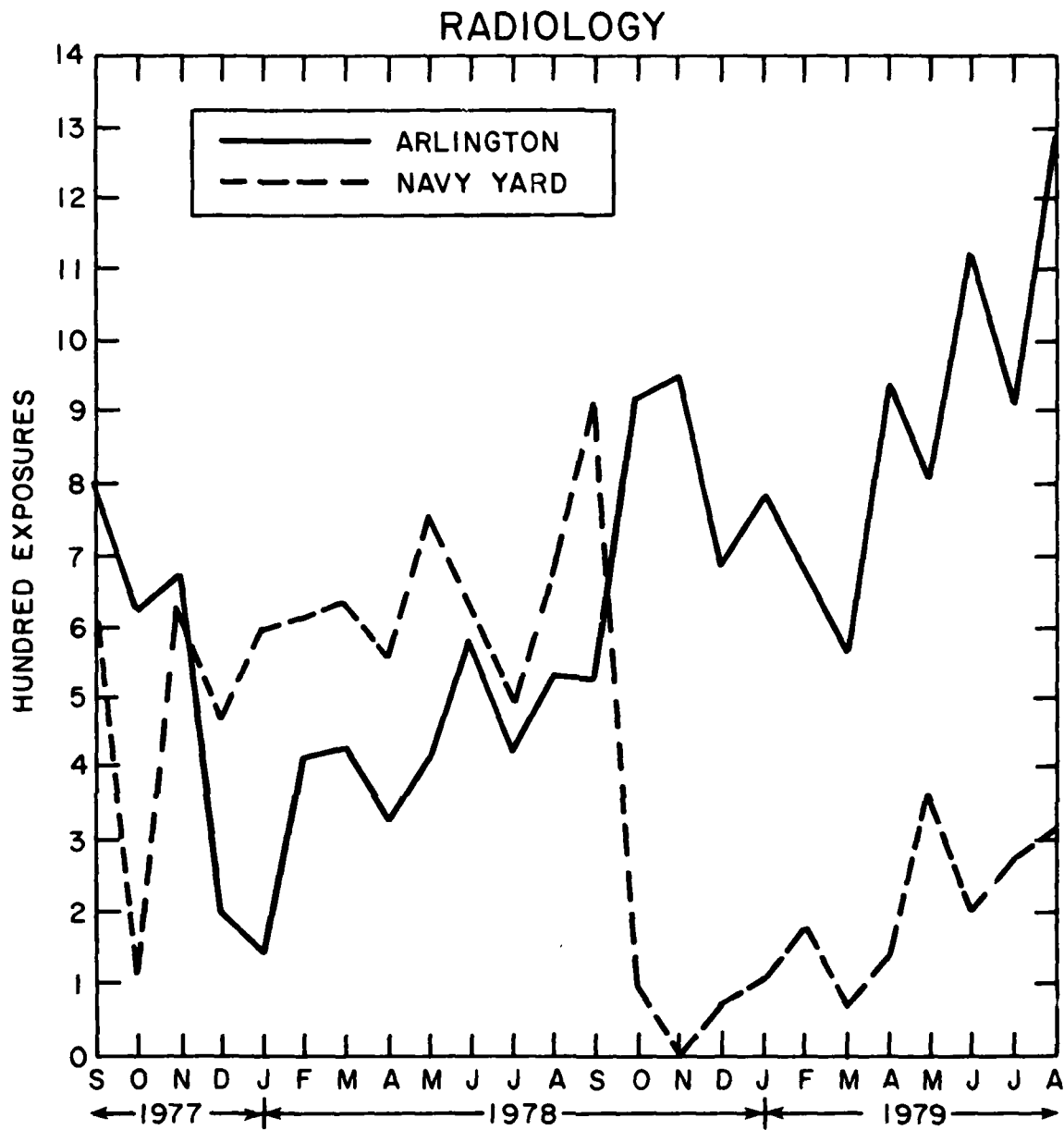
Table 4-7 presents Radiology exposure data for Arlington Annex and the Washington Navy Yard. These values are illustrated in Figure 4-3. The dramatic decrease in Navy Yard exposures, beginning October 1978, occurred as a result of a shutdown required for new equipment installation and calibration; former Navy Yard patients sought treatment at Arlington Annex and elsewhere during the transition. Other Radiology workload and structural parameters are shown in Table 4-8.

Arlington Annex maintains 10,000 Master Film Files, with about 175 new jackets created each month. Radiology personnel at Arlington see approximately 300 patients per month, resulting in 300 diagnostic procedures. The Washington Navy Yard performs approximately 100 diagnostic procedures per month.

Table 4-7
RADIOLOGY EXPOSURES - NEARBY BRANCH CLINICS

<u>Month</u>	<u>Arlington</u>	<u>Navy Yard</u>
09/77	799	615
10/77	616	122
11/77	667	614
12/77	178	468
01/78	161	593
02/78	428	612
03/78	466	637
04/78	319	556
05/78	416	754
06/78	579	632
07/78	455	486
08/78	533	678
09/78	531	925
10/78	916	109
11/78	946	0
12/78	673	75
01/79	773	102
02/79	640	176
03/79	553	60
04/79	934	140
05/79	795	360
06/79	1,151	200
07/79	916	275
08/79	1,301	312
MEAN	656	396
MAX	1,301	925
MIN	161	0
S. D.	282	265

Source: Medical Services and Outpatient Morbidity Reports.



	<u>ARLINGTON</u>	<u>NAVY YARD</u>
MEAN	656	396
MAX	1,301	925
MIN	161	0
S.D.	282	265

Figure 4-3. Radiology Exposures - Nearby Branch Clinics

Table 4-8
RADIOLOGY SITE SURVEY RESULTS - NEARBY BRANCH CLINICS

	<u>Arlington</u>	<u>Navy Yard</u>
Health Care Providers	1	1
Admin. Staff	0	0
Working Hours	0800-1600	0715-1545
Days Worked	M-F	M-F
Peak Days	M,T	None
Peak Hours	0800-1000 1300-1500	None
Exam Rooms	1	1
Mean Referrals to NNMC/Month	815	0
Max Referrals to NNMC/Month	1,301	0
Min Referrals to NNMC/Month	640	0

Source: Data Automation Site Survey.

SECTION 5

PHARMACY

5.1 NNMC, BETHESDA

The Pharmacy at NNMC, Bethesda offers the following inpatient and outpatient issues:

Inpatient

- Unit Dose
- IV Additives
- Ward Orders
- Narcotic Issues
- Controlled Issues
- Alcohol Issues
- Ward Prescriptions
- Anesthesia Issues

Outpatient

- Regular Prescriptions
- Regular Refills
- Clinic Issues
- Pre-Packs (Building 123)
- Staff Issues
- Narcotic Issues
- Controlled Issues
- Miscellaneous Issues

Monthly inpatient and outpatient workload counts are recorded in Table 5-1 and Figure 5-1. The dramatic decrease in inpatient issues, beginning 1 April 1979, occurs because the NNMC, Bethesda Pharmacy instituted a new method of inpatient workload reporting at that time. In the past, if a patient were issued a certain medication four

Table 5-1
PHARMACY ISSUES - NMMC, BETHESDA

<u>Month</u>	<u>IP Issues</u>	<u>OP Issues</u>	<u>Total</u>
09/77	109,834	31,320	141,154
10/77	114,372	32,950	147,322
11/77	108,098	38,934	147,032
12/77	80,485	35,216	115,701
01/78	91,335	36,289	127,624
02/78	208,363	33,250	241,613
03/78	172,197	37,381	209,578
04/78	116,543	42,628	159,171
05/78	110,614	43,076	153,690
06/78	123,286	45,091	168,377
07/78	100,412	41,199	141,611
08/78	168,874	49,617	218,491
09/78	106,313	49,385	155,698
10/78	147,418	44,042	191,460
11/78	122,852	44,240	167,092
12/78	87,754	40,332	128,086
01/79	98,687	50,905	149,592
02/79	115,222	43,318	158,540
03/79	144,666	52,929	197,595
04/79	54,238 *	41,223	95,461 *
05/79	50,397 *	44,918	101,315 *
06/79	43,837 *	42,088	85,925 *
07/79	46,024 *	41,463	87,487 *
08/79	50,630 *	43,560	94,190 *
MEAN	107,435	41,890	149,325
MAX	208,363	52,929	241,613
MIN	43,837	31,320	85,925
S. D.	41,606	5,635	41,825

*Change to unit dose accounting methodology.

Source: Medical Services and Outpatient Morbidity Reports.

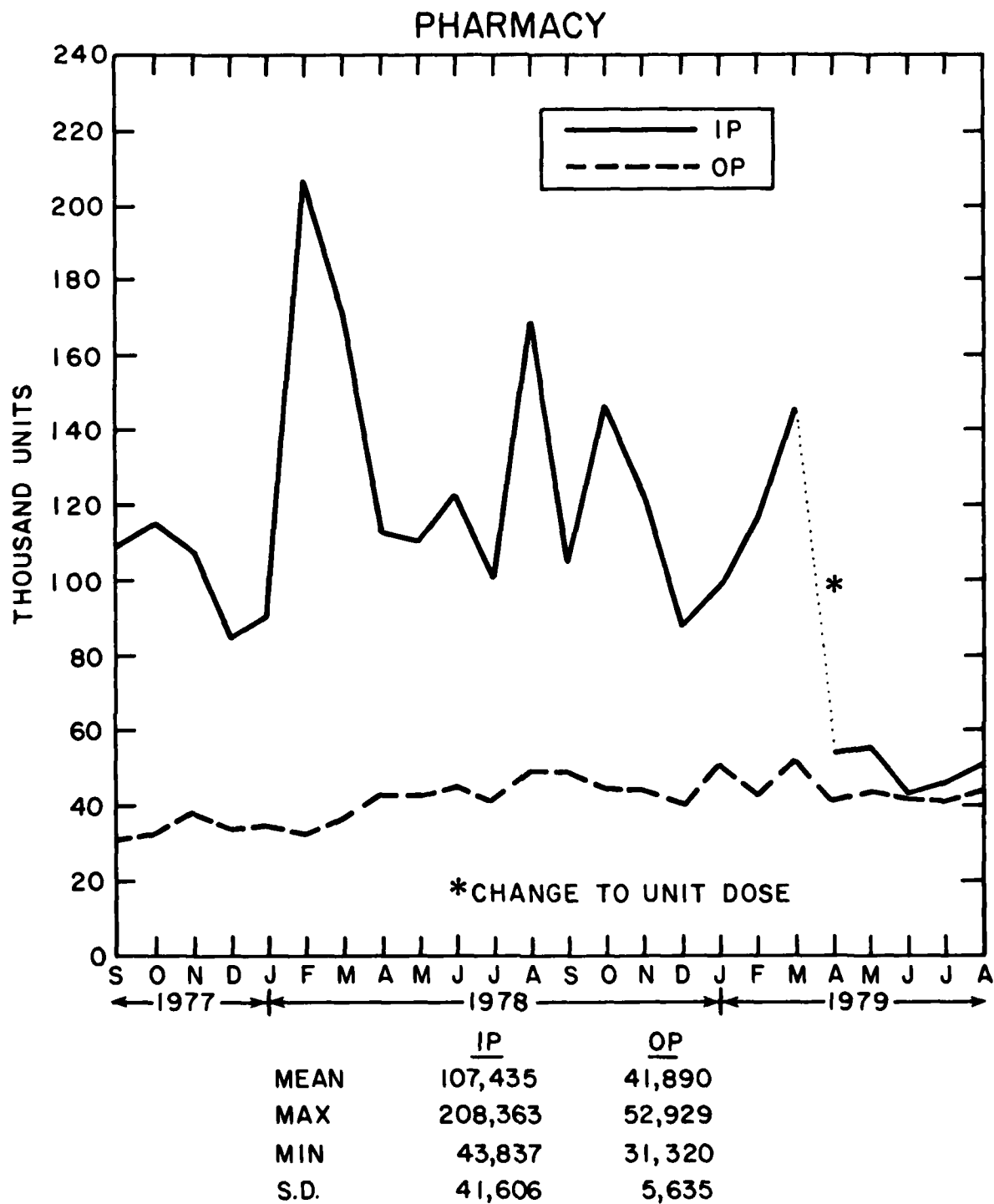


Figure 5-1. Pharmacy Issues - NMMC, Bethesda

times a day, the Pharmacy staff would record these transactions as four separate issues; today, those four dispensations of the same medication would be regarded as one unit dose (or issue). Similarly, previous IV additive workload accounting reflected the number of ingredients going into an admixture; today, each IV solution is counted as one workload unit, regardless of its composition. Outpatient workload counts were not affected by this change.

Peak inpatient workloads often correspond to heavy demands in the Intensive Care Unit because a few seriously ill patients may require a multitude of medications and IV feedings; this intense demand by a small population is not adequately reflected in the inpatient admission statistics. Daily outpatient workloads for a one-week period in November 1979 are shown in Table 5-2, counting both patients and prescriptions. Administrative sources within the Pharmacy describe department workload variability as follows:

	<u>0800-1630</u>	<u>1630-2400</u>	<u>2400-0800</u>
Monday	Heavy	Moderate/Light	Light
Tuesday	Heavy	Moderate/Light	Light
Wednesday	Moderate	Moderate/Light	Light
Thursday	Moderate	Moderate/Light	Light
Friday	AM Heavy/PM Light	Moderate/Light	Light
Saturday	AM Moderate/PM Light	Light	Light
Sunday	Light	Light	Light

NNMC, Bethesda offers centralized unit dose dispensing, with all medication carts filled in the central Pharmacy area. Piggyback IV and hyperalimentation services are also provided, although clinical Pharmacy applications cannot be optimized without data automation support. At present, staff pharmacists manually assess each patient regimen, interpreting physicians' orders, screening for allergies, checking for dangerous pharmaceutical admixtures, and examining overall patient therapy profiles for negative food, laboratory, and other interactions (i.e., the adverse reactions of some medications to sunlamp therapy). The Pharmacy also provides an in-house drug information center, and supports the outlying and nearby branch clinics with pre-packs, compounds, and specialty items.

Order requests reach the Pharmacy in one of several ways: physician order sheets for most inpatient medications; a separate pharmacist review of ward cardex files for IV solutions; military and civilian prescription charts; phone calls from the wards; and ward requests at the Pharmacy order window. Problems may be encountered with missing order sheets and physician changes.

Over 1600 inventory line items are available from the NNMC Pharmacy. There is one outpatient prescription window for requests, and another window for Pharmacy issues; a separate order window handles ward requests from 0800-1130 and 1300-1630. Regular department operating hours run from 0800-1630 Monday through Friday, with emergency services available from 1630-2300 on weekdays and 0800-2300

Table 5-2
PHARMACY PRESCRIPTIONS AND OUTPATIENTS
PER DAY - NNMC, BETHESDA

<u>Day</u>	<u>Outpatients</u>	<u>Prescriptions</u>	<u>Prescriptions Per Outpatient</u>
Monday *	163	279	1.71
Tuesday	817	1,520	1.86
Wednesday	632	1,289	2.04
Thursday	690	1,153	1.67
Friday	687	1,089	1.59
Saturday	313	477	1.52
Sunday	103	273	2.65 **
TOTAL	3,405	6,080	1.79

* Unusually light workloads are shown because Monday counts were taken on Veterans Day, a government holiday. Note the rise in Tuesday's workload, illustrating the typical peak period following a holiday.

** This increase may be due to the severity of the conditions which necessitate Sunday visits, as well as the absence of routine refills on Sunday.

n = 7 days (November 1979).

Source: Department Workload Counts.

on weekends. On-call Pharmacy personnel handle duties from 2300-0800. Staffing for the Pharmacy may be broken out as follows:

- Pharmacists (Officer) = 11 (plus 1 open billet)
- Pharmacists (Civilian) = 1 (plus 1 open billet)
- Pharmacy Technicians (Enlisted) = 20 (plus 6 open billets)
- General Duty Corpsmen (Enlisted) = 6 (plus 2 open billets)
- Supply Technician (Civilian) = 1
- Secretary (Civilian) = 1

5.2 OUTLYING CLINICS

Workload data pertaining to Pharmacy operations at the three major outlying clinics are shown in the following displays: Table 5-3 (Annapolis); Table 5-4 (Quantico); and Table 5-5 (Patuxent River). These trends are graphically presented in Figure 5-2. Additional information, obtained from the results of the Data Automation Site Survey of January 1980, is presented in Table 5-6. The survey sheets may be found as Appendix A to this report.

The need for a Tri-Service approach to automated Pharmacy systems was stressed by administrative sources, who cited the high potential for drug abuse which exists in an area with easy access to a number of Navy, Air Force, and Army medical facilities, like Metropolitan Washington, D.C. The need for broad and current patient profiles, encompassing areawide hospitals and clinics, would screen out the "shoppers" which currently make Pharmacy stops throughout the area.

Civilian prescriptions and those issued by NNMC, Bethesda or other military medical treatment facilities are filled by the Pharmacies at Annapolis, Quantico, and Patuxent River when the prescribed medications and signature authority are on hand; otherwise, these scripts are referred to NNMC, Bethesda or other facilities for handling. NNMC, Annapolis offers outpatient IV additive services 5-6 times per week for patients requiring chemotherapy. Naval Hospital, Patuxent River services inpatients on a unit dose basis (i.e., one medication dispensed four times per day counted as one workload unit).

5.3 NEARBY BRANCH CLINICS

Pharmacy issues for the Arlington Annex and Washington Navy Yard facilities are shown in Table 5-7 and Figure 5-3. These data are supplemented by the results of the Data Automation Site Survey, Table 5-8. The Arlington Annex Pharmacy serves 1721 outpatients per month, while the Washington Navy Yard handles 1500 outpatients at its Pharmacy each month. Specialty medications are referred to NNMC, Bethesda each day as required.

Table 5-3
PHARMACY ISSUES - ANNAPOLIS CLINICS

<u>Month</u>	<u>NRMC</u>	<u>USNA</u>	<u>Total</u>
09/77	9,526	2,193	11,719
10/77	10,217	2,074	12,291
11/77	11,143	2,187	13,330
12/77	9,747	2,089	11,836
01/78	11,669	2,306	13,975
02/78	8,735	4,753	13,488
03/78	10,119	2,857	12,976
04/78	9,178	2,897	12,075
05/78	11,686	2,943	14,629
06/78	9,345	1,149	10,494
07/78	8,159	2,010	10,169
08/78	9,219	3,398	12,617
09/78	8,457	2,591	11,048
10/78	9,576	2,933	12,509
11/78	9,021	2,961	11,982
12/78	8,759	1,719	10,478
01/79	12,303	1,542	13,845
02/79	8,700	2,151	10,851
03/79	10,031	2,168	12,199
04/79	10,097	2,119	12,216
05/79	8,771	1,978	10,749
06/79	7,298	494	7,792
07/79	9,112	2,010 *	11,122 *
08/79	10,548	2,579	13,127
MEAN	9,642	2,338	11,980
MAX	12,303	4,753	14,629
MIN	7,298	494	7,792
S. D.	1,196	814	1,497

*Estimated.

Source: Medical Services and Outpatient Morbidity Reports.

Table 5-4
PHARMACY ISSUES - QUANTICO CLINICS

<u>Month</u>	<u>NRMC</u>	<u>MCDEC</u>	<u>Total</u>
09/77	10,044	2,071	12,115
10/77	9,566	2,359	11,925
11/77	9,876	2,047	11,923
12/77	10,182	1,914	12,096
01/78	10,697	2,048	12,745
02/78	9,484	2,748	12,232
03/78	10,816	2,139	12,955
04/78	8,678	1,541	10,219
05/78	8,062	1,920	9,982
06/78	7,388	1,806	9,194
07/78	6,731	3,781	10,512
08/78	6,650	2,597	9,247
09/78	6,608	2,005	8,613
10/78	7,131	2,987	10,118
11/78	7,407	1,493	8,900
12/78	6,722	1,391	8,113
01/79	6,574	1,765	8,339
02/79	7,685	1,415	9,100
03/79	8,034	1,815	9,849
04/79	7,305	1,808	9,113
05/79	5,892	1,519	7,411
06/79	5,654	1,933	7,587
07/79	5,515	2,592	8,107
08/79	5,574	1,946	7,520
MEAN	7,845	2,068	9,913
MAX	10,816	3,781	12,955
MIN	5,515	1,391	7,411
S. D.	1,685	554	1,772

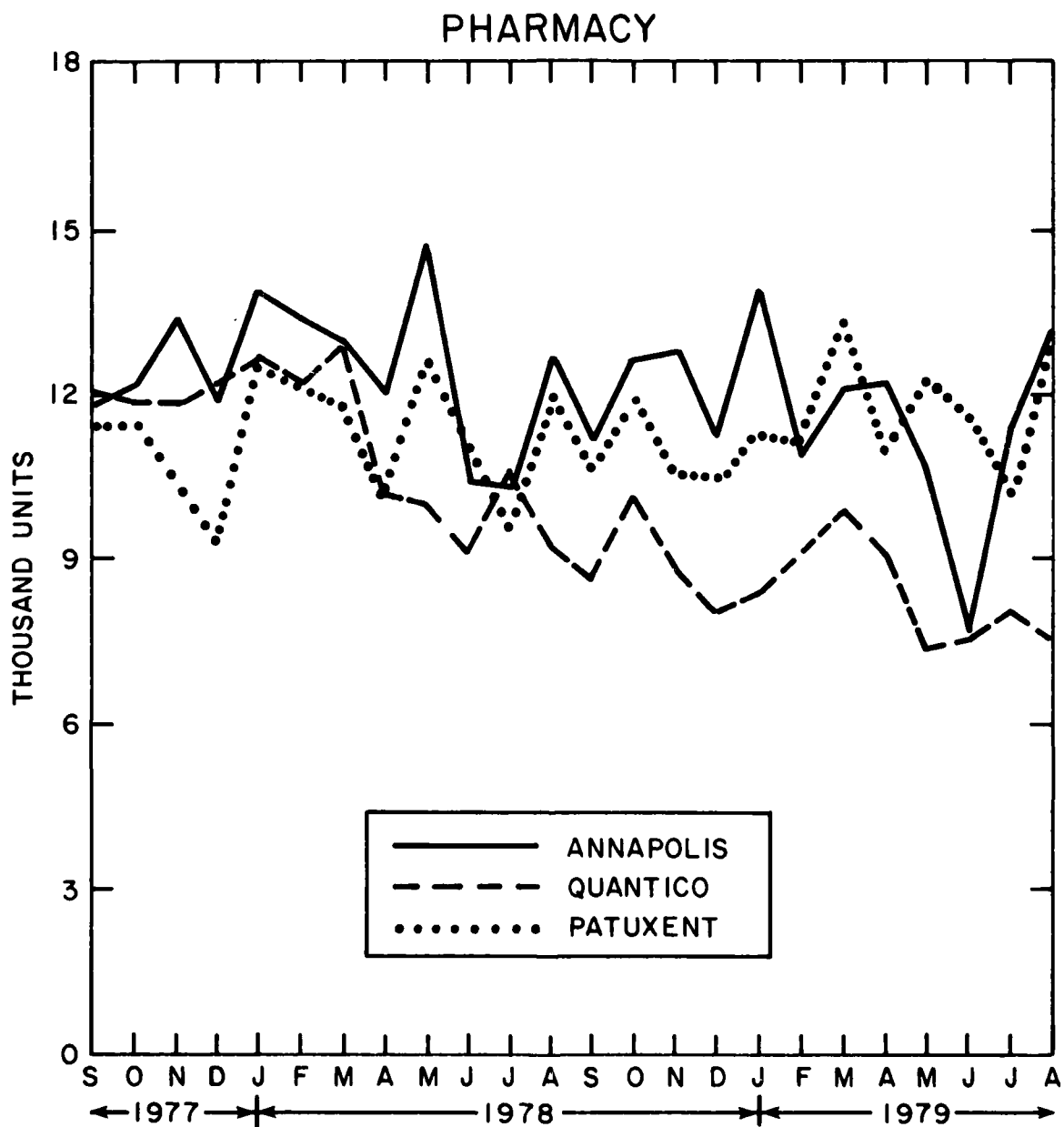
Source: Medical Services and Outpatient Morbidity Reports.

Table 5-5

PHARMACY ISSUES - NAVAL HOSPITAL, PATUXENT RIVER

<u>Month</u>	<u>IP Issues</u>	<u>OP Issues</u>	<u>Total</u>
09/77	1,994	9,451	11,445
10/77	3,101	8,356	11,457
11/77	2,794	7,865	10,659
12/77	2,223	7,276	9,499
01/78	3,110	9,605	12,715
02/78	2,735	9,456	12,191
03/78	3,044	8,701	11,745
04/78	2,840	7,541	10,381
05/78	3,310	9,246	12,556
06/78	2,335	8,697	11,032
07/78	2,230	7,448	9,678
08/78	2,811	9,145	11,956
09/78	2,488	8,406	10,894
10/78	3,499	8,485	11,984
11/78	2,447	8,090	10,537
12/78	2,587	7,835	10,422
01/79	2,126	9,135	11,261
02/79	3,012	8,165	11,177
03/79	3,266	9,927	13,193
04/79	2,545	8,529	11,074
05/79	3,549	8,743	12,292
06/79	3,148	8,329	11,477
07/79	2,518	7,620	10,138
08/79	3,867	9,251	13,118
MEAN	2,816	8,554	11,370
MAX	3,867	9,927	13,193
MIN	1,994	7,276	9,499
S.D.	488	739	1,010

Source: Medical Services and Outpatient Morbidity Reports.



	<u>ANNAPOLIS</u>	<u>QUANTICO</u>	<u>PATUXENT</u>
MEAN	11,980	9,913	11,370
MAX	14,629	12,955	13,193
MIN	7,792	7,411	9,499
S.D.	1,497	1,772	1,010

Figure 5-2. Pharmacy Issues - Outlying Clinics

Table 5-6
PHARMACY SITE SURVEY RESULTS - OUTLYING CLINICS

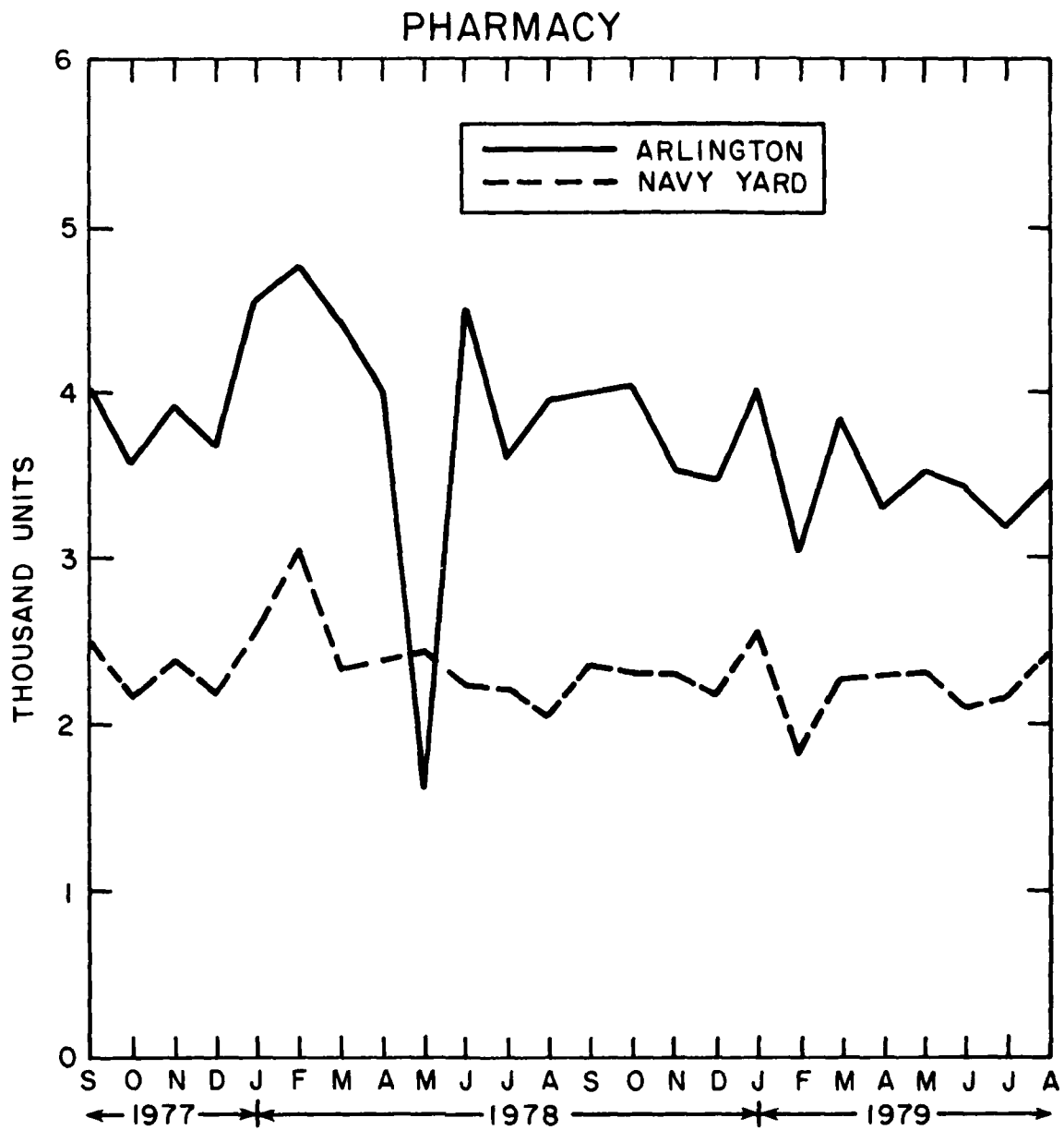
	<u>NRMC Annapolis</u>	<u>USNA Annapolis</u>	<u>NRMC Quantico</u>	<u>Patuxent River</u>
Health Care Providers	6	1	6	6
Admin. Staff	1	0	0	0
Working Hours	0800-1630 0800-1200	0730-1600	0730-2000 0800-1700	0630-2200
Days Worked	M-Sa	M-F	M-Sa	M-Su
Peak Days	M,F	W	M,F	M,T,F
Peak Hours	1000-1200 1400-1600	0730-0930 1230-1330	0930-1200 1330-1600	1000-1200 1300-1430
Order Windows	1	1	1	1
Issue Windows	1	1	1	1
Mean Referrals to NNMC/Month	60	8	88	64
Max Referrals to NNMC/Month	60	8	112	72
Min Referrals to NNMC/Month	60	8	43	60

Source: Data Automation Site Survey.

Table 5-7
PHARMACY ISSUES - NEARBY BRANCH CLINICS

<u>Month</u>	<u>Arlington</u>	<u>Navy Yard</u>
09/77	4,056	2,541
10/77	3,584	2,167
11/77	3,913	2,337
12/77	3,661	2,183
01/78	4,546	2,581
02/78	4,754	3,036
03/78	4,348	2,341
04/78	4,012	2,384
05/78	1,574	2,469
06/78	4,482	2,248
07/78	3,591	2,043
08/78	3,930	2,380
09/78	3,955	2,352
10/78	4,073	2,270
11/78	3,570	2,272
12/78	3,476	2,140
01/79	4,051	2,561
02/79	3,069	1,863
03/79	3,831	2,276
04/79	3,348	2,283
05/79	3,517	2,210
06/79	3,415	2,079
07/79	3,220	2,164
08/79	3,455	2,484
MEAN	3,726	2,319
MAX	4,754	3,036
MIN	1,574	1,863
S. D.	627	230

Source: Medical Services and Outpatient Morbidity Reports.



	ARLINGTON	NAVY YARD
MEAN	3,726	2,319
MAX	4,754	3,036
MIN	1,574	1,863
S.D.	627	230

Figure 5-3. Pharmacy Issues - Nearby Branch Clinics

Table 5-8
PHARMACY SITE SURVEY RESULTS - NEARBY BRANCH CLINICS

	<u>Arlington</u>	<u>Navy Yard</u>
Health Care Providers	2	1
Admin. Staff	0	0
Working Hours	0800-1600	0715-1545
Days Worked	M-F	M-F
Peak Days	M,T	M
Peak Hours	1000-1200 1330-1500	0900-1100
Order Windows	1	1*
Issue Windows	1	1*
Mean Referrals to NNMC/Month	40**	40**
Max Referrals to NNMC/Month	22**	22**
Min Referrals to NNMC/Month	60**	60**

*One window serves both orders and issues at the Navy Yard Pharmacy.

**Estimates.

Source: Data Automation Site Survey.

SECTION 6

INPATIENT AFFAIRS

6.1 DEPARTMENT OPERATIONS

The Inpatient Affairs area at NNMC, Bethesda presents a unique situation, because this facility serves a worldwide community of active duty, retired, dependent, and other beneficiaries (including high level officials from the Washington D.C. government community). For this reason, the regional catchment population figures presented in Section 2 do not realistically describe the potential inpatient demand. The administrative responsibilities of Inpatient Affairs include:

- Inpatient Chart Control. An average of 40-50 persons are admitted and discharged each day, with chart and record management the responsibility of the Inpatient Affairs staff. All charts and records are manually audited for accuracy and completeness, with separate jackets required for multiple admissions. Approximately 15,000 records are assembled each year; 65,000-75,000 records are on hand at any given moment. Inpatient records are retired to archives after a period of five years.
- Active Duty Inpatient Chart Control. A separate record-keeping function exists for all charts of admitted and discharged active duty personnel.
- Medical Evacuation. Inpatient Affairs coordinates approximately 35 referrals from around the world to various NNMC, Bethesda clinics each week. No patients are referred out of the Bethesda facility, with the exception of some drug and alcohol rehabilitation patients. This function includes administrative coordination of the inpatient detoxification effort, sometimes required by patients before release to the NNMC, Bethesda Alcohol Rehabilitation Service (ARS), an outpatient treatment center.
- Decedent Affairs. The duties required in the processing of a patient's death include: autopsy permit; tissue removal permit; active duty casualty report; personal note to the next-of-kin; state death certificate; and disposition of remains. These functions are all handled by Inpatient Affairs.
- Automated Multi-Phasic Health Testing (AMHT). The department has controlled all records pertaining to this pre-admission testing program since its inception in December 1979.
- Medical Holding Company. Administrative updates are required for all inpatients and outpatients temporarily assigned to this unit because of physical inability to resume regular active duty positions.
- Medical Boards. Inpatient Affairs processes information and issues reports on the status of persons undergoing Medical Board review.

- Disability Evaluation System Counseling. The department provides information and referral services to active duty Navy and Marine Corps personnel.
- Temporary Disability Retiree List. Physical examinations are required for temporary disability retirees every 18 months, for up to a maximum of 5 years. Inpatient Affairs provides narrative updates and coordinates arrangements.
- Tumor Case Registration. Inpatient Affairs maintains a separate report file for each beneficiary with a malignant tumor condition, tracking each patient's health records from diagnosis through death.
- Serious List/Very Serious List. Daily updates are provided for each patient's condition.
- Medical Care Recovery Act. Inpatient Affairs processes billings, reports, and correspondence regarding those patients involved with third party liability.
- Civilian Medical Bills. Department operations include the accounting of civilian medical bills for those patients accruing charges while on vacation, during emergency situations, etc.
- Correspondence. The correspondence handled by Inpatient Affairs includes those dealing with Workmen's Compensation cases, Veterans' Administration, insurance claims, and family requests. Narrative summaries are provided in these and related cases.

Inpatient Affairs offices operate from 0730-1630, Monday through Friday; duty personnel handle admissions at all other times. Word processors transcribe data during two shifts: 0800-1630 and 2300-0700. The Inpatient Affairs staffing profile breaks out as follows:

- Administrative (Officer) = 2 (plus 1 open billet)
- Administrative (Enlisted) = 9
- Administrative (Civilian) = 38

6.2 DEPARTMENT WORKLOAD

Monthly figures for admissions, live births, deaths, and discharges are presented in Table 6-1; these workloads are illustrated in Figures 6-1 and 6-2. Please note that live births occurring without complications are not charged as an admission; only those infants requiring continued hospitalization after the mother's discharge are actually "admitted" to Bethesda NMMC. Deaths are included in the totals given for discharges, and a discharge action is taken for every death. Please note that admissions do not equal discharges from month to month, because patients may be carried over from one month to the next.

Table 6-1
INPATIENT WORKLOAD - NNMC, BETHESDA

<u>Month</u>	<u>Admissions</u>	<u>Live Births</u>	<u>Deaths</u>	<u>Discharges</u>
10/77	1,068	86	16	998
11/77	1,039	90	16	1,111
12/77	897	89	18	981
01/78	1,148	64	17	963
02/78	1,008	71	19	1,029
03/78	1,113	69	16	1,116
04/78	1,051	75	22	1,098
05/78	1,165	72	21	1,085
06/78	1,101	60	24	1,191
07/78	1,135	75	13	1,071
08/78	1,164	67	13	1,205
09/78	1,004	78	18	1,068
10/78	1,149	72	18	1,122
11/78	1,058	65	14	1,095
12/78	917	84	23	1,054
01/79	1,320	64	19	1,144
02/79	977	52	16	1,027
03/79	1,186	77	22	1,176
04/79	1,161	67	18	1,116
05/79	1,158	62	16	1,179
06/79	1,136	54	10	1,191
07/79	1,237	75	24	1,190
08/79	1,351	87	24	1,341
09/79	1,090	60	18	1,077
MEAN	1,110	71	18	1,110
MAX	1,351	90	24	1,341
MIN	897	52	10	963
S. D.	109	11	4	85

Source: Inpatient Workload Summaries.

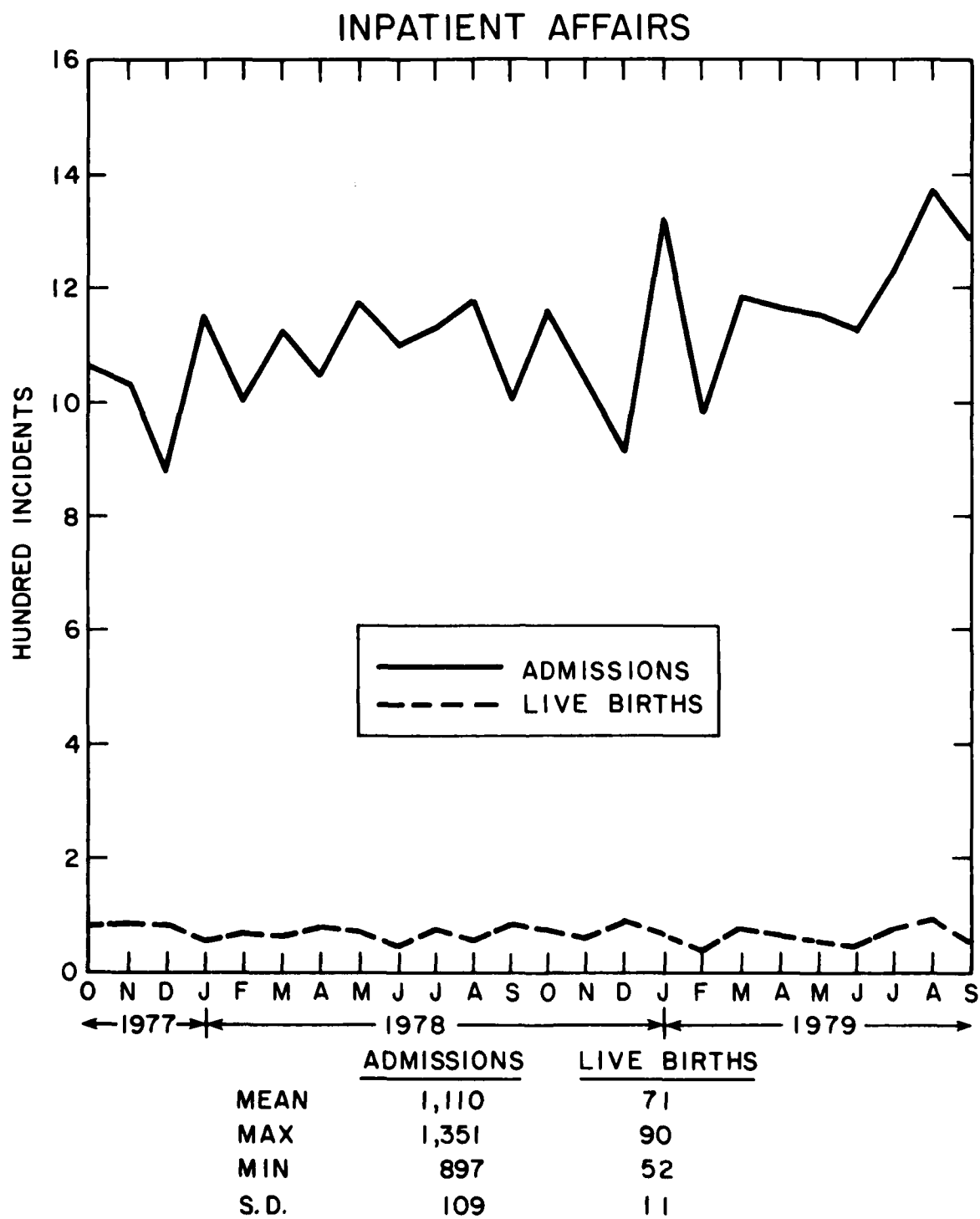
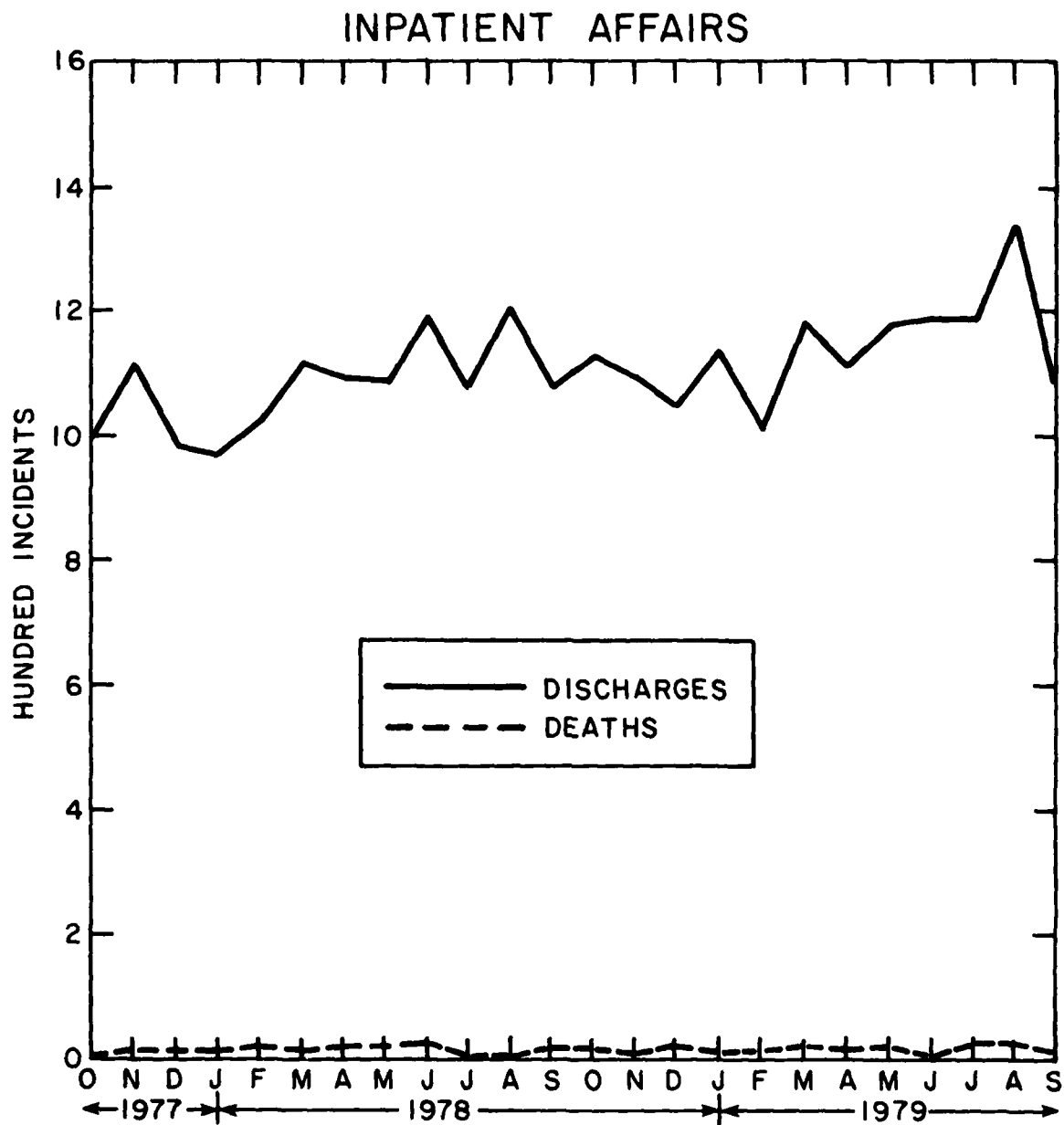


Figure 6-1. Admissions and Live Births -
NNMC, Bethesda



	DISCHARGES	DEATHS
MEAN	1,110	18
MAX	1,341	24
MIN	963	10
S.D.	85	4

Figure 6-2. Discharges and Deaths - NNMC, Bethesda

Table 6-1 represents cumulative workload for all existing patient types, which include:

- 24 Active Duty categories
- 7 Retired categories
- 14 Dependent categories
- 26 Other categories (Congress, NATO, humanitarian, etc.)
- 10 Newborn categories

Admissions are broken out by patient category in Table 6-2, and graphically presented in Figure 6-3. Hourly admissions for a representative 7-day period (January 1980) are shown in Table 6-3 and Figure 6-4; note midday peak demand, as well as the second peak period in the later evening brought on as a result of medical evacuations to NNMC, Bethesda.

NNMC, Bethesda currently maintains 566 assembled beds, not including those reserved for teaching and research functions. The occupancy rate is usually around 80 percent. The average length of stay at Bethesda is 10.3 days, reflecting the significant number of patients transferred from around the world for lengthy and complicated treatments. Bethesda's turnover rate (total monthly dispositions divided by average daily patient load) is presented in Figure 6-5; here, peak periods correspond to intense demands on the data communications environment. In compiling these turnover rates, a disposition refers to any change in patient status involving NNMC, Bethesda and an outside concern. Examples of dispositions include discharges, deaths, transfers to another hospital, transfers to the Medical Holding Company, etc. If the average daily patient load were equal to 400 in a given month, with 1200 dispositions recorded for that same time period, a turnover rate of 3 (1200 divided by 400) would result. The data communications workload for this month would be greater than for a month with a turnover rate of 2, and less than if the turnover rate were 4.

Most admissions are channeled through the one input area at the main admissions desk. However, approximately 50 patients per month enter as "direct admissions" to the wards, either through the Emergency Room or an outpatient clinic. In these cases, personnel from the Inpatient Affairs staff go directly to the Emergency Room or to the receiving ward to collect admissions data. Peak admission demands occur on Mondays, as well as the day following a holiday. Peak discharges take place on Fridays.

Currently one data terminal is located in the Inpatient Affairs area, linked to the automated LABIS system. However, because the LABIS system is not designed to provide an Inpatient Affairs function, information update problems exist regarding specific inpatient data elements (e.g., current ward location). This information lag necessitates manual data communications in virtually all instances, with the LABIS terminal providing a limited confirmation function.

Table 6-2
ADMISSIONS BY PATIENT CATEGORY - NNMCM, BETHESDA

<u>Month</u>	<u>Active Duty</u>	<u>Retired</u>	<u>Dependent</u>	<u>Other</u>
10/77	306	200	521	41
11/77	247	208	536	48
12/77	224	159	482	32
01/78	311	249	564	24
02/78	262	207	500	39
03/78	301	220	555	37
04/78	283	193	541	34
05/78	337	250	549	29
06/78	339	197	533	32
07/78	339	217	544	35
08/78	356	196	587	25
09/78	325	193	462	24
10/78	363	223	538	25
11/78	313	192	528	25
12/78	270	179	441	27
01/79	405	274	607	34
02/79	323	212	419	23
03/79	370	240	549	27
04/79	411	226	494	30
05/79	386	235	509	28
06/79	371	223	522	20
07/79	410	273	534	20
08/79	410	272	639	30
09/79	372	222	473	23
MEAN	335	219	526	30
MAX	411	274	639	48
MIN	224	159	419	20
S. D.	53	30	50	7

Source: Department Workload Counts.

INPATIENT AFFAIRS

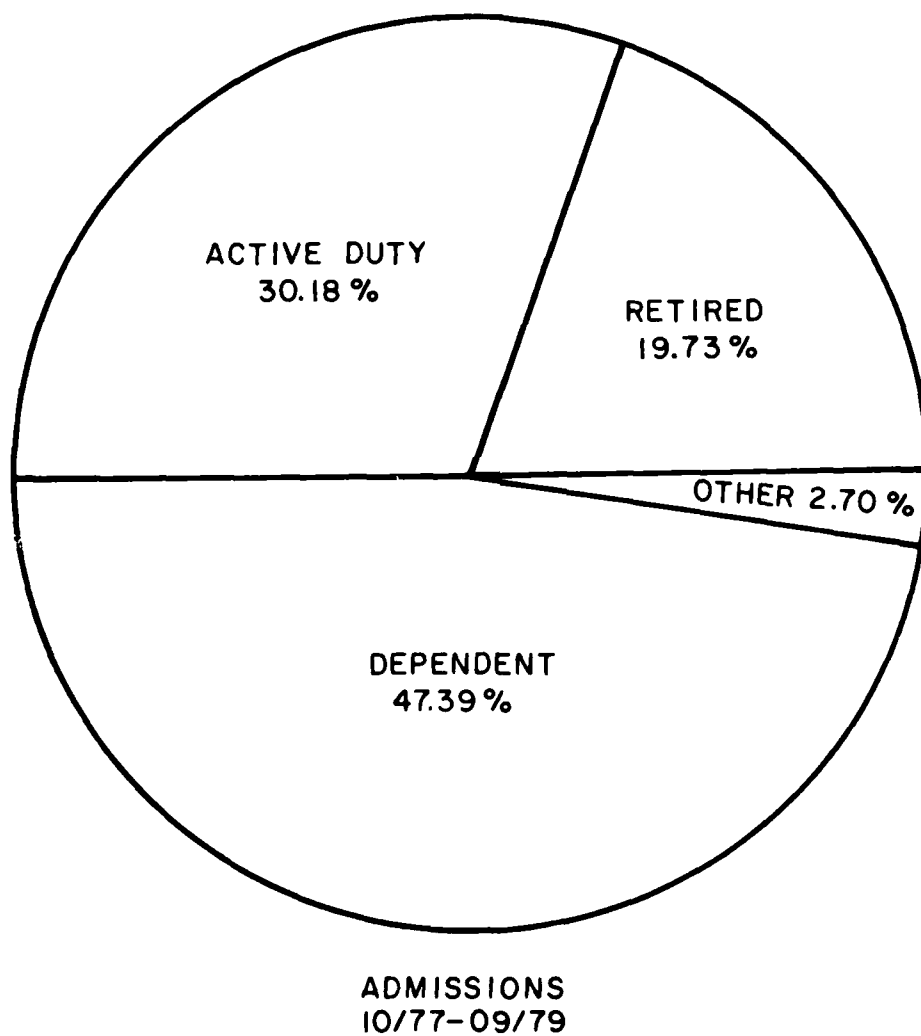


Figure 6-3. Admissions by Patient Category - NNMC, Bethesda

Table 6-3
ADMISSIONS PER HOUR - NNMC, BETHESDA

<u>Hour</u>	<u>MON</u>	<u>TUES</u>	<u>WED</u>	<u>THUR</u>	<u>FRI</u>	<u>SAT</u>	<u>SUN</u>	<u>MEAN</u>
0000-0100	1	0	0	0	0	0	1	.29
0100-0200	0	1	0	0	0	0	0	.14
0200-0300	0	1	0	0	1	0	0	.29
0300-0400	0	0	0	0	1	0	0	.14
0400-0500	1	0	0	0	0	0	0	.14
0500-0600	2	2	0	0	0	0	0	.57
0600-0700	0	0	0	0	1	0	0	.14
0700-0800	1	0	0	0	2	1	0	.57
0800-0900	8	8	6	4	3	0	1	4.29
0900-1000	9	13	4	13	5	0	2	6.57
1000-1100	10	10	7	8	1	0	4	5.71
1100-1200	7	2	3	8	4	2	3	4.14
1200-1300	11	4	2	6	4	0	1	4.00
1300-1400	3	4	3	8	0	0	0	2.57
1400-1500	3	5	5	4	0	1	2	2.86
1500-1600	3	4	3	3	1	1	8	3.29
1600-1700	3	2	1	1	1	0	0	1.14
1700-1800	3	1	2	0	1	1	1	1.29
1800-1900	1	3	0	1	2	1	0	1.14
1900-2000	2	2	5	1	2	0	3	2.14
2000-2100	0	3	2	0	0	1	0	.86
2100-2200	0	0	7	0	1	0	5	1.86
2200-2300	0	0	5	5	3	2	0	2.14
2300-2400	0	1	2	1	1	1	1	1.00
TOTAL	68	66	57	63	34	11	32	47

n = 7 days (January 1980).

Source: Department Workload Counts.

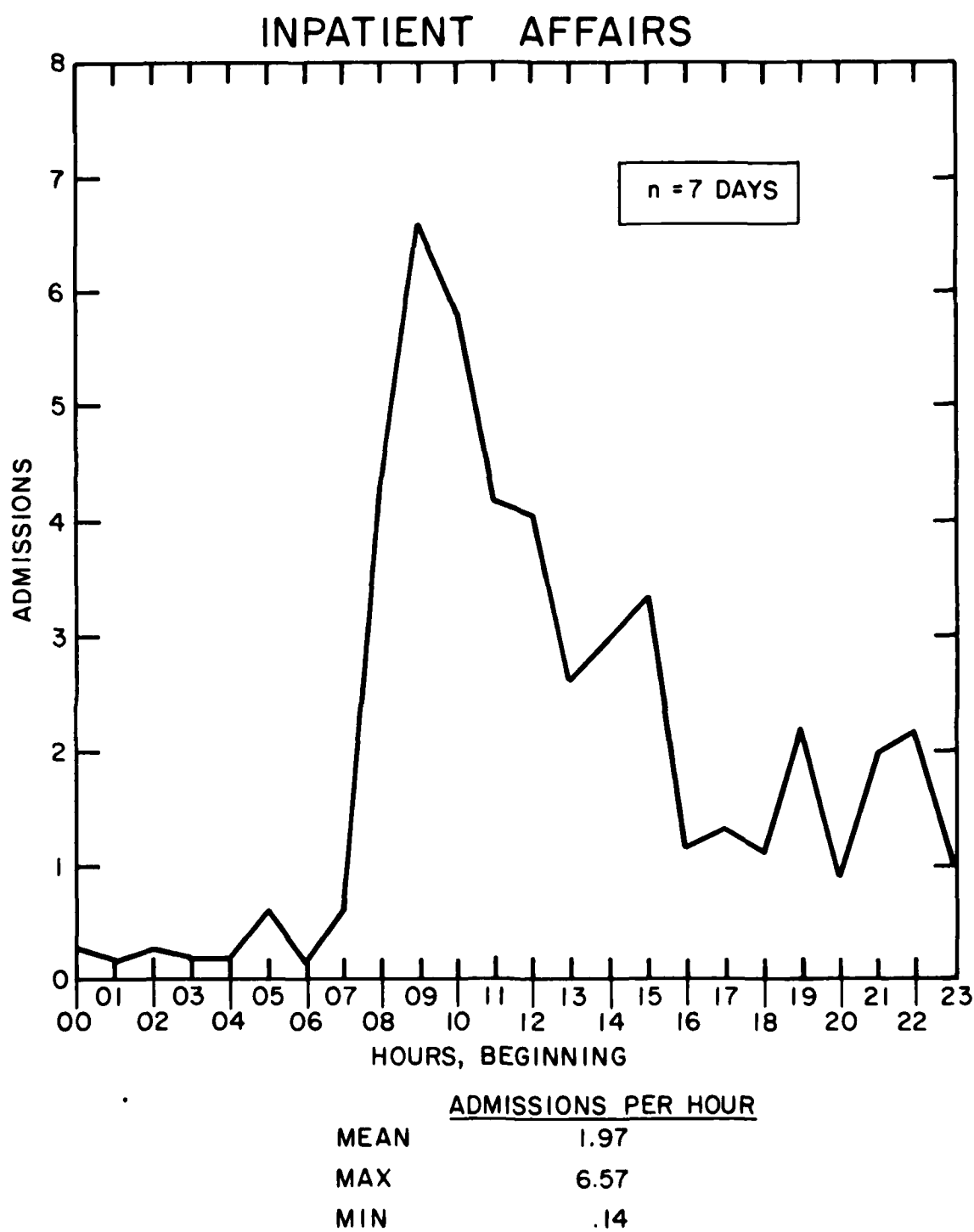
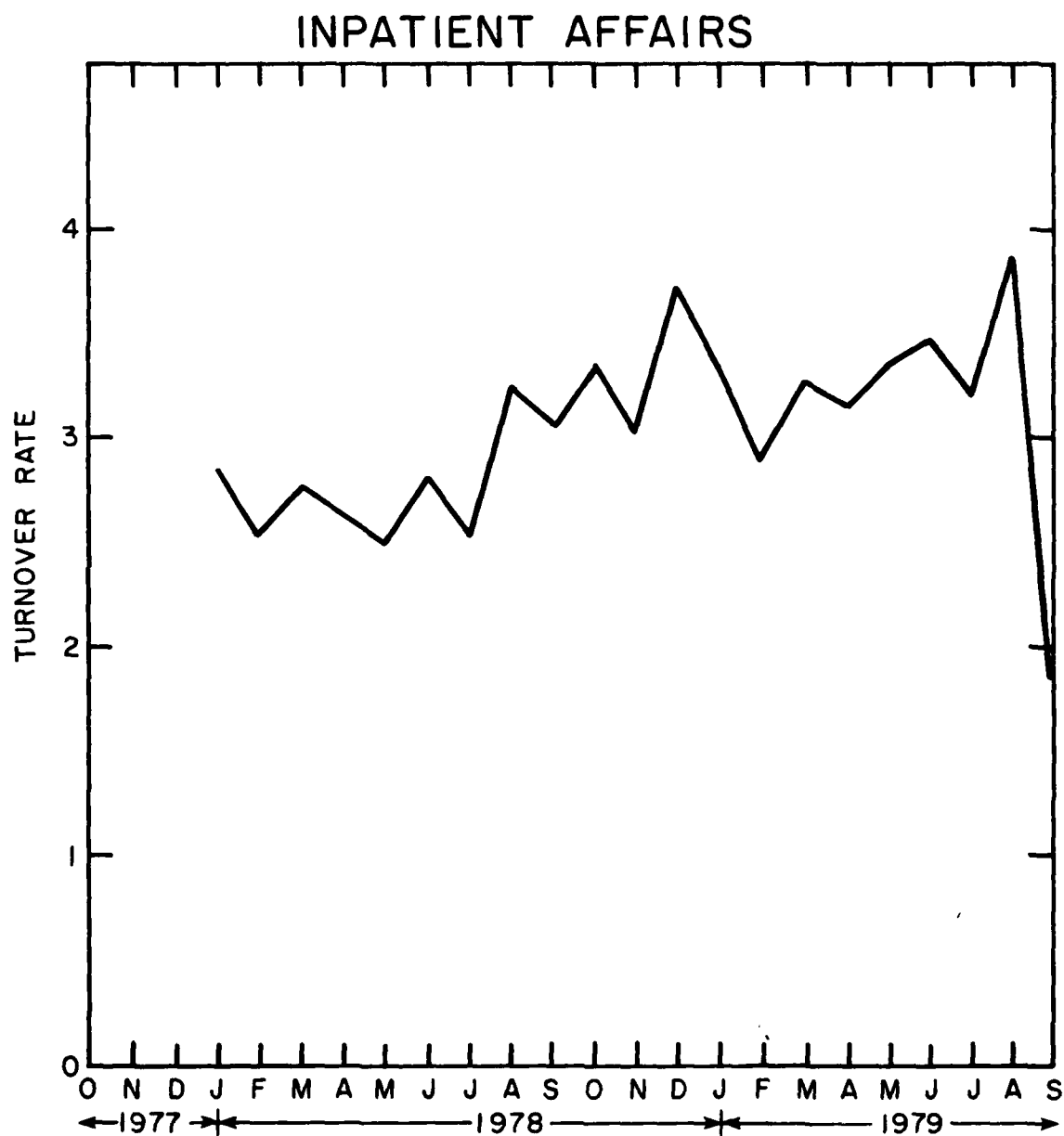
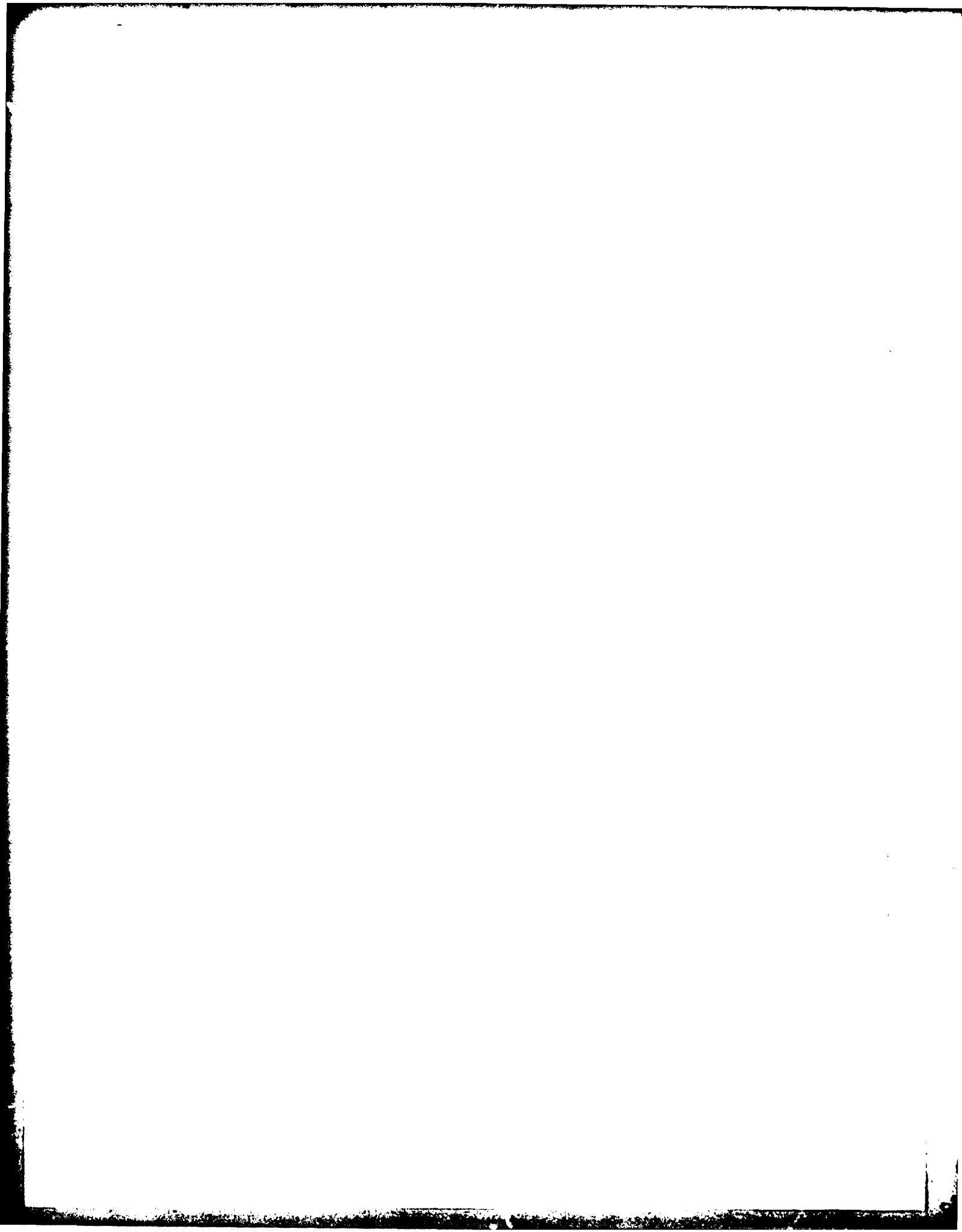


Figure 6-4. Admissions Per Hour - NNMC, Bethesda



$$\text{TURNOVER RATE} = \frac{\text{TOTAL MONTHLY DISPOSITIONS}}{\text{AVERAGE DAILY PATIENT LOAD}}$$

Figure 6-5. Inpatient Turnover Rate - NNMCC, Bethesda



SECTION 7
FOOD SERVICE

7.1 DEPARTMENT OPERATIONS

Food Service operations at NNMC, Bethesda encompass both ward (inpatient) and dining room (ambulatory inpatient, outpatient, staff, and other) issues. Functional requirements for Food Service operations have been identified as follows:

Inpatient

- Dietary Requests
- Medical Records
- Dietary Records
- Menu Selection
- Patient Education
- Aeromedical Staging Flights

Outpatient

- Patient Education
- Medical Records

Nutritional Analysis

- Clinical Nutritional Analysis
- Departmental Nutritional Analysis

Planning

- Menus
- Forecasts
- Production

Inventory

- Food
- Expendable Supplies

Production

- Central Ingredient Assembly
- Production Schedule
- Packaging/Portioning Control
- Nourishment Control

Service

- Patient Tray Assembly
- Dining Room

AD-A092 729

WESTEC SERVICES INC SAN DIEGO CA F/G 6/5
PATIENT WORKLOAD PROFILE: NATIONAL NAVAL MEDICAL CENTER (NNMC),--ETC(U)
JUN 80 W T RASMUSSEN, H W HOLMERUD N66001-80-M-1628

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NOSC-TD-377

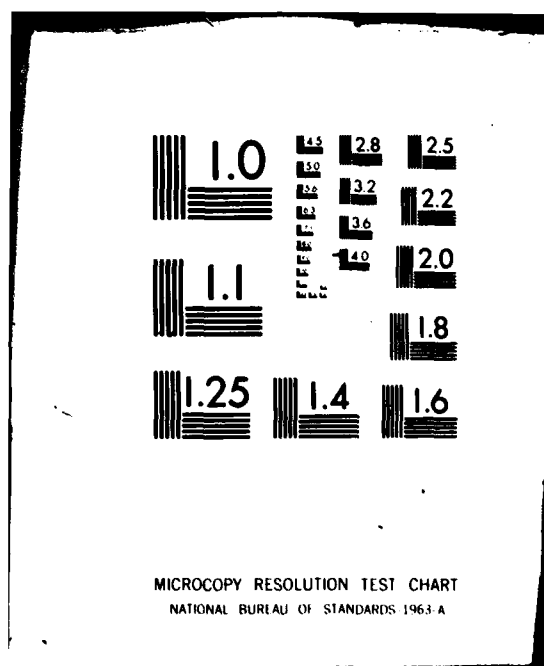
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Financial Management Control

- Financial Parameters
- Food Cost Accounting
- Equipment Cost Accounting
- Labor Cost Accounting
- Expendable Supplies Cost Accounting
- Contract Cost Accounting
- Ration Accounting

Personnel

- Employee Roster
- Employee Work Schedule
- Employee Time and Attendance

Training

- Planning
- Management
- Computer Training

Quality

- Food Control
- Equipment Control

Research

- Operational
- Educational
- Research Data Bank

The voluminous data elements currently processed through this manual system include:

- 5060 total menu items (on a revolving 22-day cycle)
- 2500 distinct menu items
- 1250 recipes (excluding therapeutic recipes)
- 800 ingredients

Each recipe contains from 5 to 30 ingredients, with a standard batch yielding 100 portions. Because the standard 100-portion batch seldom occurs in actual operations, over 5000 yield adjustments (involving multiple ingredients) are required during each 22-day cycle. To complicate matters further, not all adjustments can be calculated arithmetically, i.e., if a 100-portion batch calls for 10 tablespoons of pepper, a 200-portion batch may require only 15 tablespoons.

Therapeutic diets provide an additional dimension to total Food Service operations. A complete listing of therapeutic diets appears later (as Table 7-2), but may be summarized as follows:

- Modifications in Consistency
- Modifications in Carbohydrates, Proteins, and Fats
- Modifications in Calories
- Modifications in Carbohydrates
- Modifications in Proteins
- Modifications in Fats
- Modifications in Minerals
- Elimination Diets (Allergy)
- Test Diets

Each of these diets require changes to most regular recipes, with corresponding impact to the data communications environment. Patients requiring therapeutic diets would further benefit from volume and nutrient intake calculations, available from automated systems but prohibitively time-consuming on a manual basis. Although therapeutic diets primarily impact Food Service operations on the wards, some special diets are prepared for the dining room to provide a learning environment for persons requiring continuing diet modifications, e.g., diabetics.

Food Service in the Replacement Hospital will offer "restaurant style" menus, with a basis of 40 entrees and 150 potential selections (regular diet only). Meal selection in the wards will be performed each morning, with offerings to include that evening's dinner and the following day's breakfast and lunch. Therapeutic diets will be provided on a similar basis.

Three distinct inventories are maintained by Food Service: Government Stock (Navy Stock Fund); Hospital In-House Warehouse; and Manufactured Goods Inventory. Department hours are 0630-2000, seven days per week. The staffing profile is as follows:

Administration and Stores Branch

- Administrative (Officers) = 2
- Administrative (Civilians) = 5
- Warehouse (Civilians) = 3

Production and Service Branch

- Food Service Workers (Civilians) = 90

Clinical Nutrition Branch

- Dieticians (Officers) = 3
- Dieticians (Civilian) = 1
- Diet Technicians (Civilian) = 5

7.2 DEPARTMENT WORKLOAD

Food rations served on the wards and in the dining room at NNMC, Bethesda are presented in Table 7-1, and these data are plotted in Figure 7-1. In this system of workload accounting, one ration is equal to any three meals; therefore, the mean value of 21,789 rations per month may be translated as 65,367 meals per month ($n = 24$ months). Peak workload periods occur during lunch, with meals in the dining room split 20-60-20 (breakfast-lunch-dinner), and those on the wards divided 30-40-30 (mainly due to the popularity of admissions before lunch and discharges after lunch).

The therapeutic diet offerings available at NNMC, Bethesda require special preparation, thereby contributing disproportionately to the Food Service workload. A listing of the available regular and therapeutic diets appears as Table 7-2. Table 7-3 shows total rations served, broken out by regular and therapeutic rations and their relative percentages. Figure 7-2 presents these proportions graphically. It should be noted that since only a small fraction of therapeutic rations are served in the dining room, the more meaningful statistic in terms of actual Food Service workload is therapeutic diets as a percentage of ward rations (26.2 percent); therapeutic diets as a percentage of total rations (11.3 percent) is meaningful only in terms of the overall data communications environment.

Inventory turnover and average cost per ration are shown in Table 7-4, and again in Figures 7-3 and 7-4. These figures refer only to food costs (fish, poultry, meats, milk, bread, canned goods, etc.); labor, overhead, and expendable non-food items are excluded. The current food budget is \$1,100,000, and the Food Service non-food budget is \$54,000.

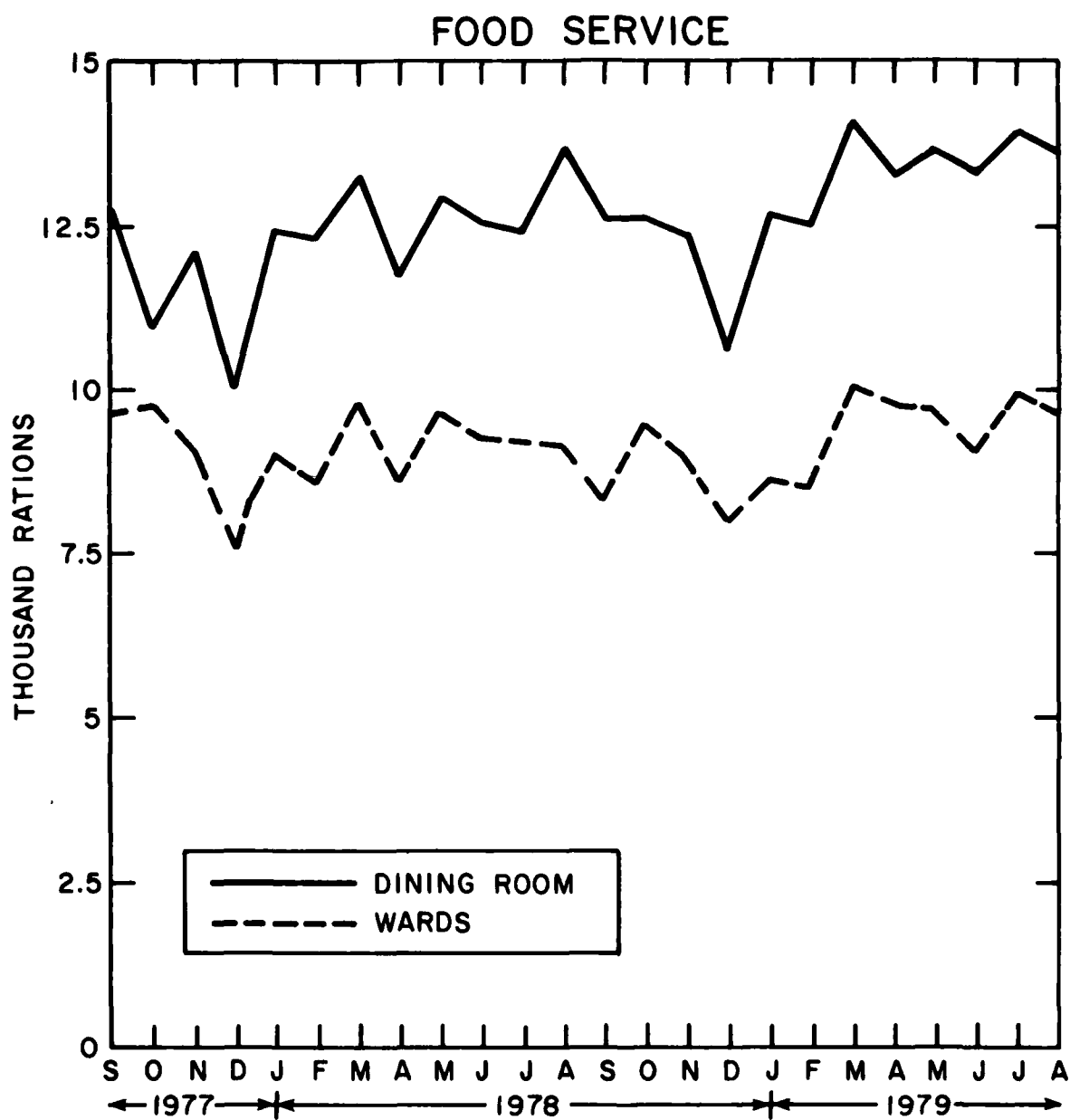
Inpatient workload inputs may come from three separate sources: the 28-32 food carts, which double as mail trucks; the 3 ward phones to the office of the diet technicians; and the 24-hour recorded Codaphone, accepting information regarding irregular admissions, transfers, and diet changes. It is estimated that approximately 50 percent of all inpatients confined to the wards change Food Service status within 24 hours, due to diet changes, transfers, discharges, and special nourishment requests; this trend is intensified with decreasing lengths of stay. One inpatient in five chooses to take meals in the dining room.

There currently exists a problem in the data communications environment, illustrated by the fact that in some months more than 100 percent of all inpatients are

Table 7-1
FOOD RATIONS SERVED - NPMC, BETHESDA

<u>Month</u>	<u>Dining Room</u>	<u>Wards</u>	<u>Total</u>
09/77	12,130	9,674	21,804
10/77	10,920	9,739	20,659
11/77	12,066	9,158	21,224
12/77	10,161	7,579	17,740
01/78	12,444	8,883	21,327
02/78	12,353	8,572	20,925
03/78	13,237	9,728	22,965
04/78	11,718	8,674	20,392
05/78	13,106	9,546	22,652
06/78	12,660	9,342	22,002
07/78	12,384	9,327	21,711
08/78	13,658	9,269	22,927
09/78	12,650	8,356	21,006
10/78	12,794	9,402	22,196
11/78	12,430	9,041	21,471
12/78	10,624	8,079	18,703
01/79	12,674	9,367	22,041
02/79	12,641	8,674	21,315
03/79	14,124	10,018	24,142
04/79	13,362	9,626	22,988
05/79	13,734	9,569	23,303
06/79	13,304	9,165	22,469
07/79	13,936	9,906	23,842
08/79	13,603	9,540	23,143
MEAN	12,613	9,176	21,789
MAX	14,124	10,018	24,142
MIN	10,161	7,579	17,740
S.D.	1,009	600	1,487

Source: Food Service Performance Analysis Report.



	DINING ROOM	WARDS
MEAN	12,613	9,176
MAX	14,124	10,018
MIN	10,161	7,579
S.D.	1,009	600

Figure 7-1. Food Rations Served - NNMC, Bethesda

Table 7-2
REGULAR AND THERAPEUTIC DIETS - NMMC, BETHESDA

Regular, Adult	Individualized Diet for Diabetes
Regular, Maternal	Diet for Maturity Onset Diabetes
Regular, Pediatric	Diet for Juvenile Diabetes
Regular, Geriatric	Diet for Gestational Diabetes
Regular, Calorie Restricted	Liberal Diet for Diabetes
Regular, High Calorie, High Protein	Liquid Diets for Diabetes
Regular, Lacto-Ovo Vegetarian	Bland Diet for Diabetes
Regular, Strict Vegetarian	Sodium Restricted Diet for Diabetes
Clear Liquid Diets	Carbohydrate Restricted, High Protein, Six Meal (Hypoglycemia) Diet
Full Liquid Diets	
Dental Liquid Diet	Post Gastrectomy Diet
Tonsillectomy/Adenoidectomy Liquid Diet	Galactose Restricted Diet
Tube Feedings	Lactose Restricted Diet
Elemental (Chemically Defined) Diets	Protein Restricted Diets
Soft Diet	Leucine Restricted Diet
Dental Soft Diet	Phenylalanine Restricted Diet
Tonsillectomy/Adenoidectomy Soft Diet	Tyramine Restricted Diet
Bland Diets	Purine Restricted Diet
High Fiber Diet	Gluten Restricted Diet
Fiber Restricted Diet	Fat Restricted Diet
Minimal Fiber, Minimal Residue Diet	Medium-Chain Triglyceride (MCT) Diet
Standard Diet for Diabetes	Fat Controlled, Cholesterol Restricted Diet

Table 7-2 (Continued)
REGULAR AND THERAPEUTIC DIETS - NMMC, BETHESDA

Hyperlipoproteinemia Diets	Sucrose-Fructose Elimination Diet
Medium-Chain Triglyceride (MCT) Ketogenic Diet	Barium Enema Preparation Diet
Traditional Ketogenic Diet	125 mg Calcium Test Diet
Sodium Restricted Diets	150 gm and 300 gm Carbohydrate Test Diets
Sodium Restricted, Calorie Restricted Diets	Fat Free Test Diet
Sodium Restricted, Fat Controlled, Caffeine Restricted, Soft Diets for Cardiac Patients	100 gm Fat Test Diet
Potassium Modified Diets	Hydroxyproline Restricted Test Diet
High Potassium Diet	Occult Blood Test Diet
400 mg Calcium Diet	Serotonin Restricted Diet for 5-Hydroxyindoleacetic Acid (5-HIAA) Test
600 mg Phosphorus Diet	Vanilmandelic Acid (VMA) Test Diet
Copper Restricted Diet	
Oxalate Restricted Diet	
Basic Elimination Diet (Allergy)	
Wheat, Egg, Milk Elimination Diet	
Wheat Elimination Diet	
Egg Elimination Diet	
Milk Elimination Diet	
Mold Elimination Diet	
Corn Elimination Diet	
Salicylate Elimination Diet	

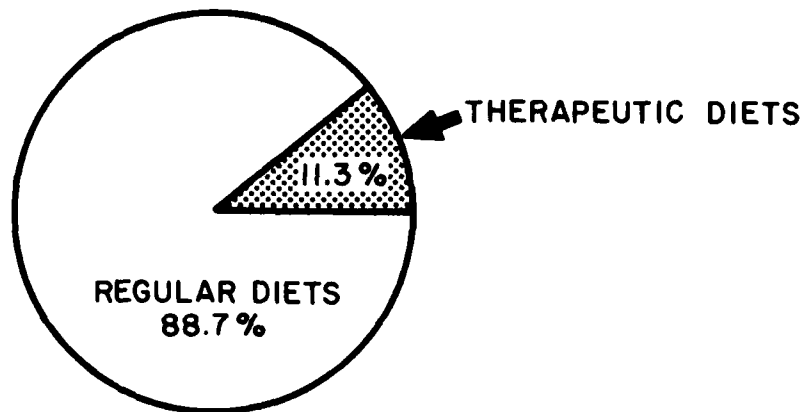
Source: Diet Manual, Department of the Air Force and the Navy, 19 November 1979.

Table 7-3
REGULAR AND THERAPEUTIC RATIONS SERVED - NNMC, BETHESDA

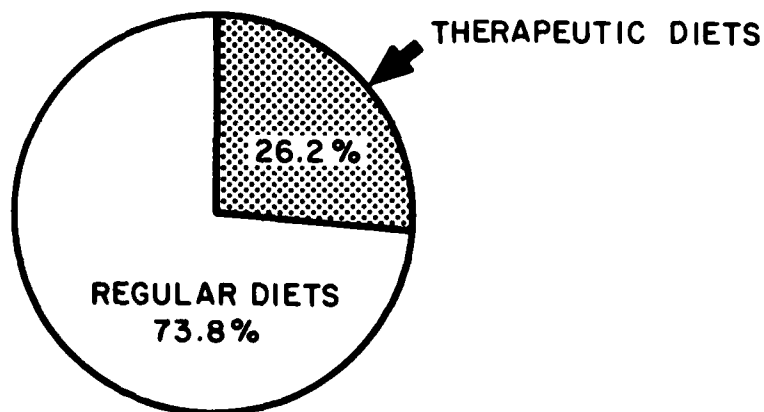
<u>Month</u>	<u>Regular Diet</u>	<u>Therapeutic Diet</u>	<u>Total Rations</u>	<u>Therapeutic as % of Ward Rations</u>	<u>Therapeutic as % of Total Rations</u>
09/77	19,542	2,262	21,804	22.90	10.37
10/77	18,240	2,419	20,659	24.22	11.71
11/77	18,741	2,483	21,224	26.59	11.70
12/77	15,642	2,098	17,740	27.02	11.83
01/78	19,141	2,186	21,327	23.91	10.25
02/78	18,810	2,115	20,925	24.02	10.11
03/78	20,471	2,494	22,965	25.12	10.86
04/78	18,113	2,279	20,392	25.21	11.18
05/78	20,169	2,483	22,652	25.35	10.96
06/78	19,505	2,497	22,002	26.34	11.35
07/78	19,173	2,538	21,711	26.76	11.69
08/78	20,294	2,633	22,927	27.72	11.48
09/78	18,552	2,454	21,006	28.96	11.68
10/78	19,636	2,560	22,196	26.81	11.53
11/78	19,100	2,371	21,471	25.75	11.04
12/78	16,610	2,087	18,703	25.08	11.16
01/79	19,450	2,591	22,041	27.45	11.76
02/79	18,867	2,448	21,315	27.48	11.48
03/79	21,301	2,841	24,142	27.32	11.77
04/79	20,319	2,669	22,988	27.05	11.61
05/79	20,670	2,633	23,303	26.83	11.30
06/79	19,824	2,645	22,469	27.74	11.77
07/79	21,057	2,785	23,842	27.29	11.68
08/79	20,608	2,535	23,143	25.95	10.95
MEAN	19,326	2,463	21,789	26.20	11.30
MAX	21,301	2,841	24,142	28.96	11.83
MIN	15,642	2,087	17,740	22.90	10.11
S. D.	1,316	206	1,487	1.47	0.50

Source: Food Service Performance Analysis Reports.

FOOD SERVICE



TOTAL RATIONS



WARD RATIONS

09/77-08/79

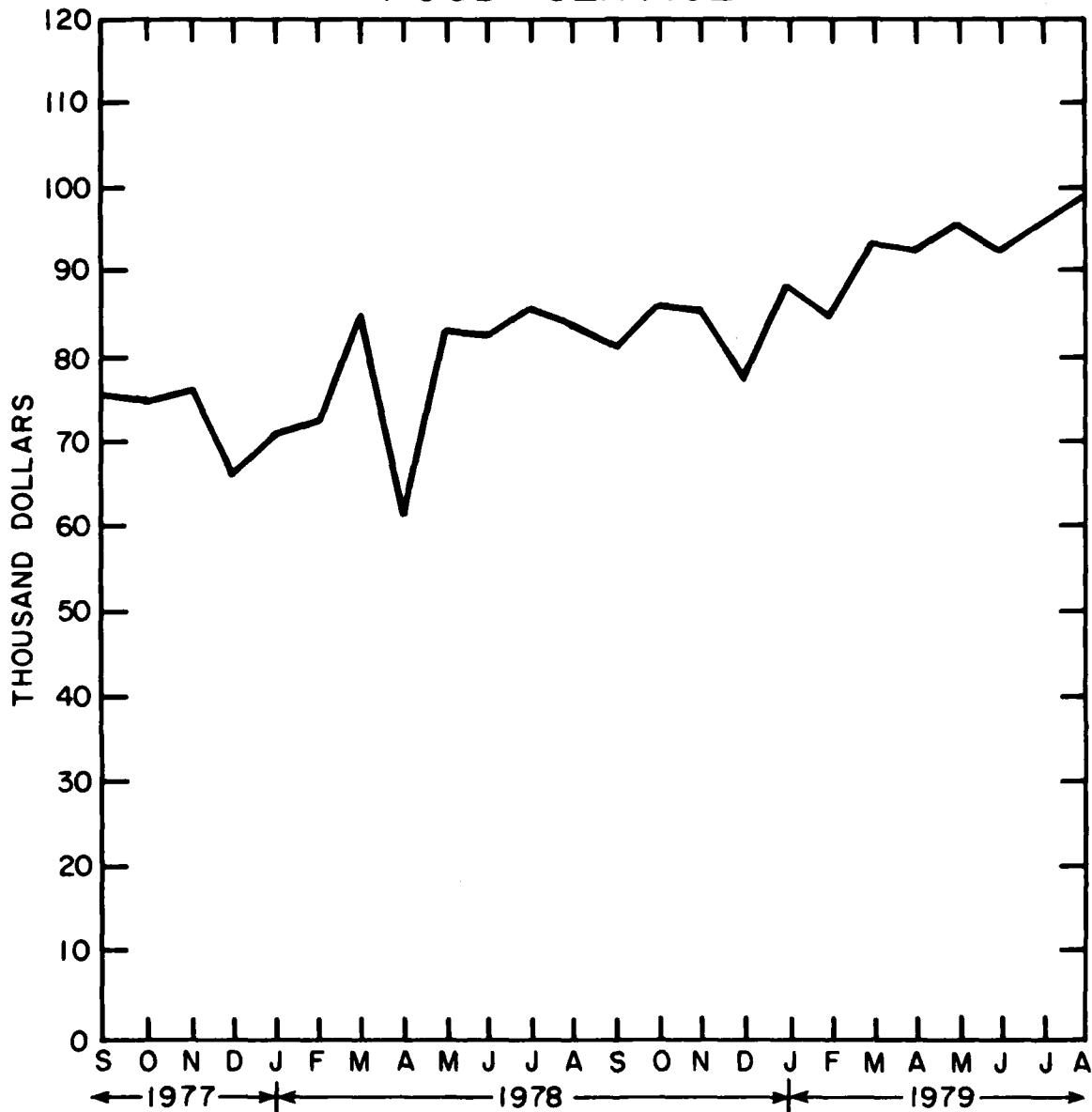
Figure 7-2. Therapeutic Diets by Percentage -
NNMC, Bethesda

Table 7-4
FOOD SERVICE COSTS - NNMCM, BETHESDA

<u>Month</u>	<u>Inventory Turnover</u>	<u>Cost Per Ration</u>
09/77	\$ 75,757	\$3.47
10/77	75,082	3.63
11/77	76,140	3.58
12/77	66,890	3.77
01/78	71,224	3.34
02/78	72,681	3.47
03/78	85,070	3.70
04/78	62,159	3.05
05/78	83,240	3.68
06/78	83,031	3.77
07/78	85,656	3.95
08/78	84,454	3.68
09/78	82,108	3.91
10/78	85,704	3.86
11/78	85,292	3.97
12/78	77,739	4.16
01/79	87,998	3.99
02/79	84,943	3.99
03/79	94,131	3.90
04/79	93,217	4.06
05/79	96,143	4.13
06/79	93,392	4.16
07/79	95,766	4.02
08/79	98,940	4.28
MEAN	\$ 83,198	\$3.81
MAX	98,940	4.28
MIN	62,159	3.05
S. D.	9,577	.29

Source: Food Service Performance Analysis Reports.

FOOD SERVICE



	INVENTORY TURNOVER
MEAN	\$ 83,198
MAX	98,940
MIN	62,159
S.D.	9,577

Figure 7-3. Food Service Inventory Turnover -
NNMC, Bethesda

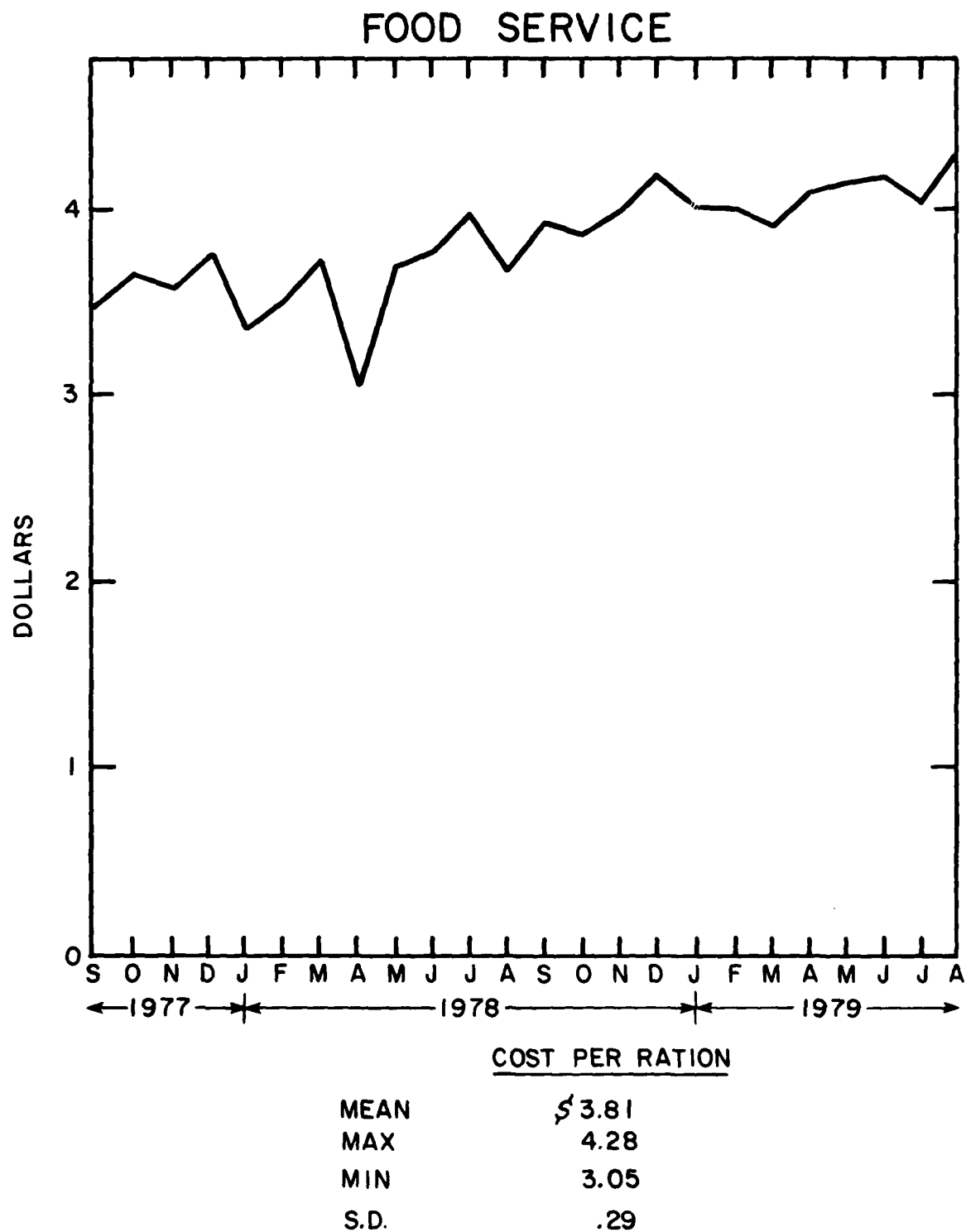
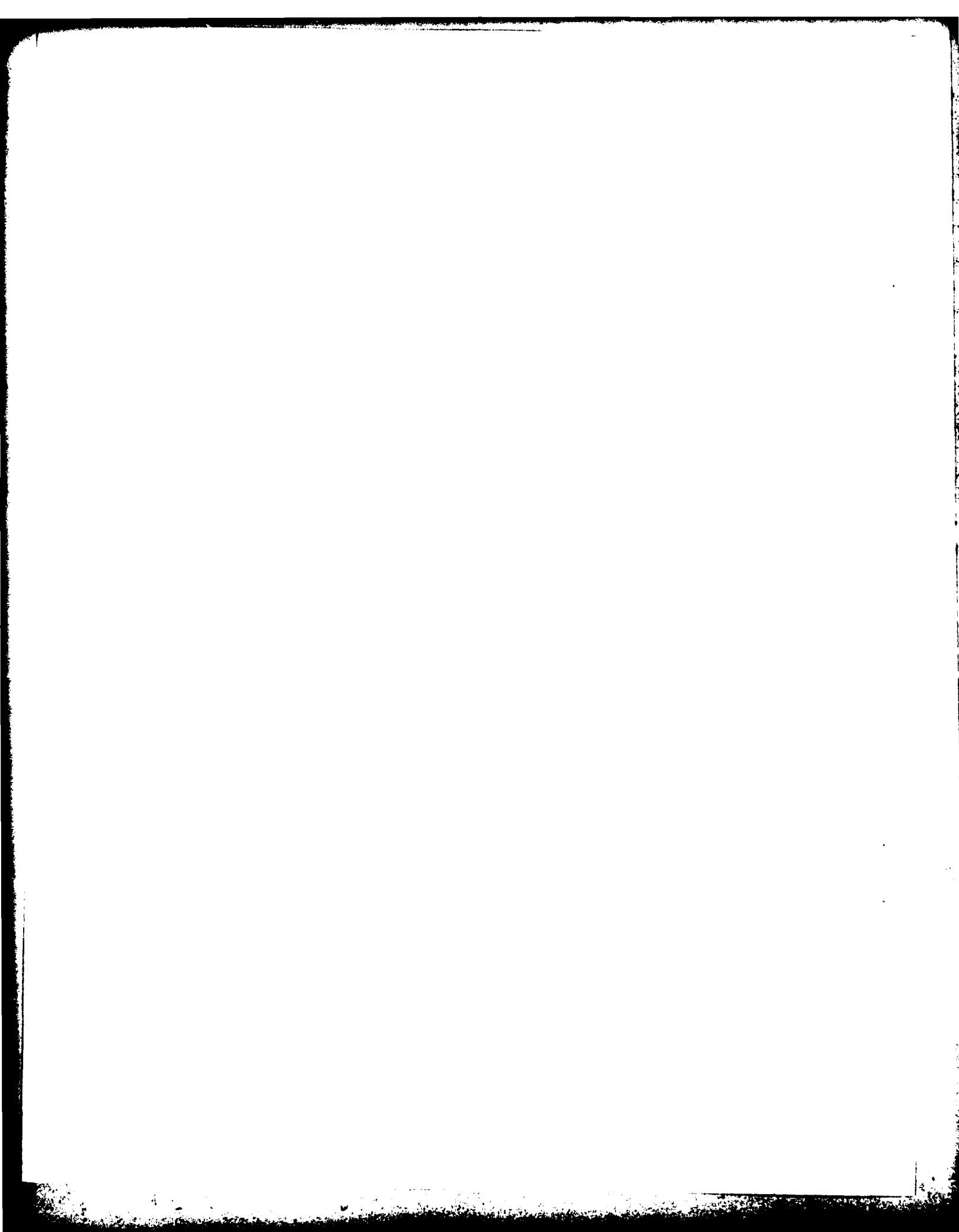


Figure 7-4. Food Costs Per Ration - NNMCC, Bethesda

served rations. This situation arises when the Food Service area is not informed of a patient's dismissal or transfer to another ward. In the case of ward transfers, personnel in the receiving ward may neglect to inform Food Service of the transfer, resulting in two trays being delivered for the same patient. Additional waste occurs when the Food Service area is not told of a patient's surgery, laboratory tests, or other procedures during a meal time; the trays arrive as scheduled, and the patient is not present to reap the benefits. Administrative sources estimate that at least \$40,000 worth of food is lost because of these communication problems each year.

APPENDIX A
DATA AUTOMATION SITE SURVEY



APPENDIX A

The following pages contain copies of the Data Automation Site Survey data collection sheets, used to establish workload and physical profiles for the following medical treatment facilities:

- NRMC, Annapolis
- NRMC, Quantico
- Naval Hospital, Patuxent River
- Branch Clinic, Arlington Annex
- Branch Clinic, Washington Navy Yard

These survey sheets preceded the onsite evaluation of each facility by representatives from WESTEC Services, Inc. and Naval Ocean Systems Center (NOSC) during January 1980. The information obtained from the Data Automation Site Survey and the onsite assessment appears throughout the text of this report. Additional site survey data are available in NOSC Technical Document 378, which serves as an accompaniment to this document.

DATA AUTOMATION

SITE SURVEY

At the request of the Naval Medical Data Services Center, the Naval Ocean Systems Center and WESTEC Services, Inc. are conducting a data automation survey at selected medical treatment facilities. This survey focuses on the existing patient workload and physical profiles of four functional areas: Patient Appointment Scheduling (PAS), Laboratory, Radiology, and Pharmacy. The data collected in this effort will be provided in a comprehensive facility communications profile; in this way, the systems destined for each facility can be properly sized and configured to meet each facility's needs.

This data automation survey is divided into three parts. First, selected statistics from Medical Services and Outpatient Morbidity Reports (dated September 1977 through August 1979) are being analyzed to determine historical patient workload parameters. Second, additional data collection and identification will be the responsibility of on-site personnel familiar with facility operations. And third, survey representatives will meet with sources from each facility during January 1980, gathering the results of the on-site collection effort and seeking additional information.

It is requested that the following data be assembled by on-site staff members prior to the arrival of the survey representatives. Staffing information should reflect current levels, while workload data should be taken from historical trends, covering a period of two years if available. If actual workload records are not available, reasonable estimates (indicated as such) will be acceptable. All physical layout and equipment descriptions should represent current configurations.

- PAS**
- # Health Care Providers _____
 - Working Hours _____
 - Peak Day(s) _____
 - # Phone Lines _____
 - # Appointments/Month: Average _____
Maximum _____
Minimum _____
 - # Administrative Staff _____
 - Days/Week Worked _____
 - Peak Hour(s) _____
 - # Appointment Desks _____
 - # No-Shows/Month _____ % of Total Appointments
 - # Cancellations/Month _____ % of Total Appointments

Lab

- # Health Care Providers _____
- Working Hours _____
- Peak Day(s) _____
- # Accessioning Stations _____
- # Referrals to Bethesda NNMC/Month: Average _____
- Maximum _____
- Minimum _____
- # Administrative Staff _____
- Days/Week Worked _____
- Peak Hour(s) _____

Rad

- # Health Care Providers _____
- Working Hours _____
- Peak Day(s) _____
- # Patient Examination Rooms _____
- # Referrals to Bethesda NNMC/Month: Average _____
- Maximum _____
- Minimum _____
- # Administrative Staff _____
- Days/Week Worked _____
- Peak Hour(s) _____

Pharm

- # Health Care Providers _____
- Working Hours _____
- Peak Day(s) _____
- # Order Windows _____
- # Administrative Staff _____
- Days/Week Worked _____
- Peak Hour(s) _____
- # Issue Windows _____

Additional information is also required concerning the four functional areas outlined above. First, all automated equipment within these four areas, i.e., those equipment containing mini-computers or controlled by micro-processors, should be listed by make and model on the spaces provided below. If these equipment are supplied with data communications ports or interfaces (e.g., RS 232C), please indicate by type.

[illegible]

Second, a physical description should be provided for each of the four functional areas. The figure shown in the attachment illustrates the level of detail required in an original sketch of this type; appropriately labeled blueprints may also fulfill this requirement.

Should you have any questions, please contact LT Bob Cary (295-0974), the Bethesda coordinator for the data automation survey effort. Additional comments are welcomed. Thank you for your support.

ATTACHMENT

